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# MEDICAL DIAGNOSIS

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The Medical Epitome Series.

# MEDICAL DIAGNOSIS.

## A MANUAL FOR STUDENTS AND PRACTITIONERS.

BY

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DORNAN, PRINTER.

# AUTHOR'S PREFACE.

In the preparation of this work on Diagnosis the effort has been made to present the subject in the most practical light, so that the little volume may serve the needs of students and answer as a convenient guide for the physician. Originality cannot and ought not to be claimed for a condensed manual on a branch so highly developed; accuracy, clearness, and completeness to date, with due sense of the relative importance of the various subjects, being its proper aims. The diseases and abnormal conditions have been treated as far as possible according to their physical and clinical signs. Where such indications are insufficient the other distinguishing characteristics have been pointed out. Many diseases for their positive confirmation require blood, pathological, bacterial, urinary, gastric, or fecal examinations, and to these attention has been directed.

The cause of failure in diagnosis in most cases is either lack of training in correct methods or insufficient knowledge of the manifestations of disease. It is hoped that this compendious work may aid its readers in acquiring the power of accurately determining the nature of any medical affection which may be presented to them.

A. W. H.

40 West Seventy-first Street,
New York.

# EDITOR'S PREFACE.

In arranging for the editorship of *The Medical Epitome Series* the publishers established a few simple conditions, namely, that the Series as a whole should embrace the entire realm of medicine; that the individual volumes should authoritatively cover their respective subjects in all essentials; and that the maximum amount of information, in letter-press and engravings, should be given for a minimum price. It was the belief of publishers and editor alike that brief works of high character would render valuable service not only to students, but also to practitioners who might wish to refresh or supplement their knowledge to date.

To the authors the editor extends his heartiest thanks for their excellent work. They have fully justified his choice in inviting them to undertake a kind of literary task which is always difficult—namely, the combination of brevity, clearness, and comprehensiveness. They have shown a consistent interest in the work and an earnest endeavor to co-operate with the editor throughout the undertaking. Joint effort of this sort ought to yield useful books, brief manuals as contradistinguished from mere compends.

V. C. P.

New York, 1905.

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# MEDICAL DIAGNOSIS.

## CHAPTER I.

### METHODS OF PHYSICAL EXAMINATION.

THE **importance of inspection** can only be properly appreciated by those who come into contact with many students. It is truly astonishing what the ordinary eye fails to see, but it is usually the untrained, older practitioner whose pitfall is the impression he obtains from observation only, neglecting, as he often does, fuller and more scientific methods of examination.

Inspection concerns the general appearances of vigor or debility; the color of the skin and mucous membranes; the condition of the tongue, teeth, and hair; the presence or absence of eruptions; examines the gait and carriage and general contour of the body almost at one glance, and then, in the due order of examination, minutely inspects separate organs and regions.

**Palpation** may be educated to an extraordinary degree; the tips of the fingers, the whole hand, or both hands are employed. The tips of the fingers appreciate surface conditions, small fluctuations and pulsations, and also the outline of abdominal and pelvic organs, new-growths, and inflammatory conditions in the abdominal cavity; with the whole hand one better appreciates vibrations like vocal fremitus, thrills, large pulsations, and big masses; with both hands or tips of the fingers one better determines size, shape, and consistence.

**Percussion.**—The character of the sound elicited by striking an object gives valuable information; we note the quality, pitch, intensity, and duration. **Direct percussion** is sometimes used over the clavicles and sternum. **Indirect percussion** is the one in common use; the middle finger or forefinger or a small piece of wood, ivory, or hard rubber (the pleximeter) is placed against

the object to be percussed, and the middle or forefinger of the opposite hand or a small mallet (the plexor) is used to strike the pleximeter. The **blow** must be delivered sharply with the finger bent almost to a right angle, but not held too stiffly, and be delivered almost entirely by the wrist motion. The use of the wooden or rubber pleximeter and mallet is only of value to those with disease or deformity of the hands, because one obtains by using the hands much valuable information from the sense of resistance and elasticity of the object percussed.

**Auscultatory percussion** is performed by placing the stethoscope over the centre of a dull area and tapping gently *toward* it; by a sudden change in the note the border of the dulness may be very accurately determined; this is especially used to find the outline of the heart. If the ear is well trained to the more simple method, just as accurate results may be obtained. When percussing over a small object very little force should be employed, but for large or deep masses use a much stronger stroke.

**Succussion.**—When liquid and air are in a good-sized cavity a sudden shake of the body will produce a splashing sound which is heard by placing the ear against the surface of the body nearest to the cavity.

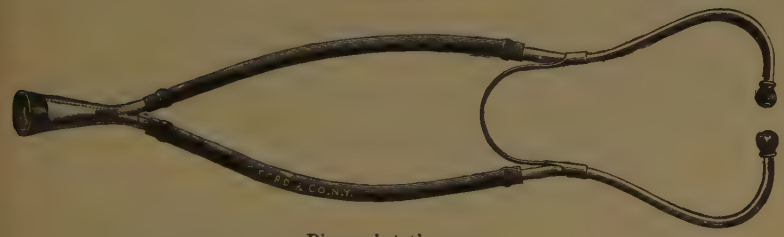
**Auscultation.**—When the bare ear, or an instrument for increasing the intensity of sounds, is placed on the chest over the heart or lungs in health certain normal sounds are heard; in disease these sounds are modified and additional ones called adventitious are often heard.

The bare ear cannot be rivalled when the sounds are of loud or moderate intensity and not sharply localized, whereas the quality of sound is more natural and distant sounds, such as are made by a central consolidation or compression of the lung, are certainly more distinctly heard; but the **stethoscope** is infinitely superior for superficial, localized, and feeble sounds, and for almost all heart sounds. It has the advantage, too, of being much more easily adjusted to certain parts of the chest, as above the clavicles and in the axilla. The kind of instrument is most important; the original single ear piece should be obsolete if it is not; the binaural, invented by Dr. Cammann, of New York, is the one in common use; the original make has been vastly improved, and the best-made instrument of to-day leaves little to be desired, if selected by a judge.

The **phonendoscope** and its more practical modification, the **Bowles stethoscope**, intensify sounds very markedly, but do not add to their clearness and definition; they are awkward and cannot be applied above the clavicle or to thin, bony chests; the arrangement with multiple ear pieces is good for class work when clinical material is limited. The Bowles is also very valuable if one wishes to listen to the back of the chest without turning the patient.

**Mensuration.**—The ordinary tape is all that is necessary for obtaining the circumference of the different parts of the body and surface distances; for the expansion of chest the "**stethometer**" of Quain or "**chest measurer**" of Sibson are very accurate; for the transverse or anteroposterior diameter of the chest large callipers may be used.

FIG. 1



Binaural stethoscope.

**Roentgen Rays.**—The great value of these in surgical diseases of the joints and bones is well known, and those who are skilled in their medical use can detect changes in size and position of the heart, tumors and aneurysms of some size, and gross lesions of the lungs and other viscera; it is beyond a doubt that improvement of the apparatus and methods of use will enable us to detect early pathological changes in tissues and organs; but even if this is so it is obvious that the cost and inconvenience of the apparatus will only allow of their use in a comparatively small number of cases.

# CHAPTER II.

## DISEASES OF THE HEART.

### THE NORMAL HEART.

THE **apex beat** is usually seen and felt in the fifth left intercostal space, three and a half inches from the midsternal line. In thick chest walls and a large thorax it is often neither seen nor felt. An **epigastric pulsation** is often normally seen, due to the impulse of the right ventricle. The **cardiac outline** may be determined quite accurately by percussion. The **area of absolute dulness** is triangular, bounded by a line extending from the junction of the fourth left costal cartilage with the sternum along its left border to the base of the ensiform cartilage, and connecting these two points with the position of the apex. The **area of relative dulness** lies between this triangle and the anatomical outline of the heart.

Percussion of the heart is beset with difficulties; in both areas in different subjects no two notes are alike; so much depends on the size of the thorax, the thickness of the chest walls, and the amount of lung development over the heart; as a guide to the size of the heart the area of absolute dulness is a fairly good one and is much more easy to determine. The note over that part of the sternum covering the heart is usually more resonant than one might expect, but this is owing to the sternal attachments which make percussion at any point give out some of the whole thorax resonance.

The **first heart sound**, which is longer and more intense than the second, is best heard at the apex.

The **second heart sound**, shorter and higher in pitch, is louder over the base; the aortic sound is best appreciated in the second and third right intercostal spaces close to the sternum, and the pulmonary in the second, third, and fourth spaces just to the left of the sternum; in children and often in young adults, especially females, the pulmonary sound is sharper and higher in pitch, while in adult men the aortic sound is generally more intense, and in old people this is the rule.

## HEART MURMURS.

Under this title we classify all sounds of a blowing, musical, or rough quality for which in a broad sense the action of the heart is responsible, but in order to facilitate our understanding of their nature we shall endeavor to make a classification according to their special causation:

Pericardial.
Endocardial.
Functional.

Extracardial
- Cardiorespiratory.
- Aneurysmal.
- Pressure.
- Arterial.
- Venous.
- Contact.
- Pleuropericardial.

**Pericardial Murmurs.**—When the pericardium is inflamed the rubbing of the visceral and parietal surfaces produces sounds which are as a rule grating, sometimes soft and blowing in **quality**, varying in **intensity**, often **increased** by pressure of the stethoscope and by the patient bending forward; in **occurrence** are usually systolic and diastolic—" to and fro "—but occasionally doubly systolic or diastolic, or systolic or diastolic only; their **point of maximum intensity** is generally in the third and fourth spaces just to the left of the sternum. They frequently are heard at this point only, but may be heard at any point over the anatomical outline of the heart. They are **localized** and are transmitted according to their intensity only.

**Endocardial Murmurs.**—These are almost invariably **made** at the different orifices. They are **caused** by a rough surface setting the passing current of blood into vibrations, or by the current in passing through a narrow point into a broader channel being thrown into an eddy which produces an abnormal sound, and occasionally by rough surface or bands in the heart cavities. The **quality** of these murmurs is usually blowing, but often rough, harsh, or musical. The **intensity** varies from being scarcely audible to a sound so loud that it may be heard with the naked ear at some distance from the chest. They are **transmitted** in the direction of the blood current along the walls of the bloodvessels and ventricles and by the chordæ tendineæ,

or through any solid medium which may be abnormally interposed between the site of the murmur and the wall of the chest. The **time** of endocardial murmur is systolic, diastolic, or presystolic.

**Functional Murmurs.**—These are not easily explained because of the few opportunities to study cases post-mortem and the impossibility of reproducing living conditions; there are, however, some very good *theoretical* explanations. Thin, watery blood is more readily thrown into vibration than thick and viscid, and it is in anæmia that we find the vast majority of such murmurs; in this condition the walls of the bloodvessels, auricles, and ventricles have lost their tone, the auricles may be dilated and surcharged, and the conus arteriosus of the right ventricle is usually dilated and hypertrophied; such conditions allow of a dilatation of the pulmonary artery and rarely of the aorta, so that the blood in flowing through a smaller orifice into a channel of larger calibre will cause an eddy or fluid vein; the pressure of enlarged auricles and the conus arteriosus may produce a narrowing of the pulmonary artery at a certain point which will cause a murmur. The relaxed auriculoventricular rings, poor action of the papillary muscles may produce real leakage at these orifices. When the blood flowing from the pulmonary veins into a left auricle which is dilated and has lost its muscular tone, the normal ratio between its tension and the blood pressure being lost, a much greater eddy must be produced and a murmur will result. They are practically always systolic, usually blowing, but occasionally rather harsh or musical. Sixty per cent. are heard over the pulmonary area alone, about 10 per cent. over the aortic area, 10 per cent. at the apex, 10 per cent. both at the apex and pulmonary area, and 10 per cent. over the area of superficial cardiac dulness; they are transmitted in the direction of the blood current and along contiguous structures, but to a far less extent than organic murmurs may be carried.

**Extracardial Murmurs.**—CARDIORESPIRATORY MURMURS are very common and, because they are so often mistaken for organic murmurs, they play a far more important role than the ordinary clinician assigns to them. The best descriptions of them are by Potain and Rosenberg, by whose names they sometimes are designated.

Their **manner of production** is the sudden displacement of

air in a portion of lung tissue adjacent to the heart because of a sudden increase of pressure when the heart dilates, or the tendency to produce a vacuum when it contracts or by the alternating striking against and receding from a portion of the lung between the heart and chest wall. The best **example** of these murmurs is found when the adjacent lung is more or less confined by adhesions, hence tuberculous patients give a large majority; but there are certainly many cases which present no signs either of pleurisy or of tuberculosis.

The **quality** of these murmurs seldom varies, being almost always blowing or puffing, and sometimes musical. Their **duration** is shorter than organic or functional murmurs their duration is never long, but the duration of an organic murmur may be short, so that this alone is not always sufficient basis of diagnosis. Their most common **situation** is just above and to the left of the nipple; they are almost never heard at the apex or inside of it toward the sternum. They are more common over the pulmonary than over the aortic area; they are occasionally found on the left side posteriorly at any point from the spine of the scapula to the tenth rib and nowhere else; their **time** is as a rule systolic, not replacing the first sound or exactly coincident with it, but occurring usually during the latter part and extending through the first pause. Diastolic murmurs of this sort are comparatively rare, and are very seldom found unless accompanied by the systolic, which they follow quickly; in such cases one can almost always ascribe the cause to pleurisy or tuberculous conditions of the lungs which prevent free play of the lung. The favorite situations for the double murmur is in the third, fourth, and fifth spaces just to the right of the sternum and between the left clavicle and the upper and left border of the heart. We sometimes find in these situations a diastolic murmur by itself. Transmission may be a marked feature; they are often heard both anteriorly and posteriorly on the left side. As a rule, however, they are not transmitted far because their intensity is never very great. A varying intensity is one of their most constant features; this is due to the respiratory movements, which change the amount of air in the lung and its relation with the heart. There is always one particular moment when, if the respiratory act is stopped, the murmur is heard at its maximum intensity and another when it may become faint or cease altogether. This moment

is never fixed at any certain period in the respiratory act in different cases, although never varying in the same case; between these two points of minimum and maximum intensity the murmur increases and diminishes during the respiratory cycle. In order to fully **explain these murmurs** one must appreciate that during systole and diastole of the heart there can be two different ways of producing them; the most common perhaps is by the sudden forcible stroke of the heart against a confined portion of lung which expels the air; if such is the case the intensity of the murmur increases with expirations, but the reverse action during systole, when the heart contracts and moves away from the lung, tending to produce a vacuum, results in sucking in or aspirating the air, and in such cases the intensity of the murmur is increased during inspiration. During diastole analogous but evidently less potent mechanical conditions produce similar results.

Aneurysmal murmurs are **caused** by the blood entering from a smaller to a larger space, an eddy resulting, or by the rough surface of the wall of the aneurysm causing vibration of the blood current or by the blood from a sac re-entering the main artery *via* a small orifice. The **quality** is usually blowing, often harsh and rough; sometimes they have a roaring, vibratory quality like the boiler-foundry sound. They are very variable in **intensity**, almost always systolic in **time**, though diastolic when the blood passes from the aneurysmal sac back into the main stream because of the elastic recoil of its wall. They are **transmitted** in the direction of the blood current and along the walls of the vessel and of the aneurysm. The majority of diastolic murmurs in aneurysm of the aorta are due to secondary incompetency of the aortic orifice owing to destruction of the valves or stretching of the aortic ring.

Murmurs due to Pressure or Bands.—The pulmonary artery and sometimes the aorta may be narrowed by the pressure of a tumor or aneurysm or adhesions. Sometimes they are distorted from the same cause. The murmurs are most frequently **found** over the pulmonary artery in marked tuberculous lesions at the left apex, with considerable loss of lung tissue. They are usually harsh and blowing in **quality**, always systolic in **time**, and **transmitted** upward. They may be **modified** by the respiratory act, usually louder during expiration, but sometimes increased during inspiration.

ARTERIAL MURMURS.—Artificial narrowing by pressure of the stethoscope or compression of the subclavian artery against the rib in very deep inspiration and possibly a reflex local contraction of the wall of the artery at one point are the **causes** of these murmurs. They are always systolic in **time** and usually harsh and grating in **quality**; they are transmitted by the blood current and along the wall of the vessel.

VENOUS MURMURS.—Pressure of the stethoscope and the intermittent or thoracic pressure during respiration **produces** humming, musical murmurs at the base of the neck. They are much more readily produced when the blood is anæmic. Their **duration** is longer than arterial murmurs. They are **almost continuous** through diastole or systole, but vary in **intensity,** being more marked during inspiration.

CONTACT OR IMPACT SOUNDS cannot properly be called murmurs, but are sometimes mistaken for such.

*The bony contact sound* is found usually when the sternum is sunken; its point of maximum intensity is just to the left of the base of the ensiform cartilage and extends in all directions from this point with diminishing intensity; it is purely systolic, short, high-pitched, and rather grating; its quality never varies.

*The stomach contact sound* is heard with maximum intensity at or just below the apex; it is transmitted slightly in all directions according to its intensity; it is nothing like a murmur, but is a short, high-pitched click or snap occurring just at the end of systole; it almost always disappears in the recumbent position, and may vary or be lost during contractions of the stomach; this sound is frequently mistaken by students for a double first or second sound.

**Pleuropericardial Murmurs.**—At any point near the borders of the heart rather dry clicking sounds are sometimes heard during the systole when there has been an adjacent pleurisy, and while these may properly be called pleuropericardial they are easy to recognize, but are not at all important; those which so closely resemble the true pericardial murmur are usually double, and are produced by the rubbing of the pleural surface on the outer surface of the pericardium against the adjacent visceral pleura; the only point where this may be done by the heart's action is at the apex and along the left border of the heart near the apex; it is here that we may get a double rub, and sometimes a single one, which only differs from the

true pericardial murmur in that at a certain point in the respiratory act it is heard with maximum intensity and often is heard at no other time, or becomes much less intense at some phase of the respiratory act. There is a sound very similar to the stomach contact snap occurring at the end of systole, heard with maximum intensity at the apex, which seems due to a band which stretches between the costal pleura and the pericardium; when the heart contracts the band is drawn taught and at the moment of relaxation produces the sound; this does not change with position as does the stomach contact sound.

The differentiation of the pleuropericardial rubbing sound would be impossible from the quality alone, but its situation at the apex and along the left border near the apex, and the probable presence of rubbing sounds over the pleura in that neighborhood, together with its being heard best at some particular point in the respiratory act, should be sufficient evidence of its nature. The absence of enlarged cardiac area and no rubbing sounds over the site of pericardial friction sounds are against pericarditis.

## HEART RHYTHM, RATE AND FORCE.

**Irregularity of cardiac rhythm, rate, and force** is a very frequent condition. The normal adult heart is quite regular in action, and beats about 72 to the minute. Temporary disturbances, as exertion or excitement, usually increase the rate and may produce slight irregularity. A full, deep inspiration in some individuals will inhibit the heart's action and may produce some irregularity. The terms used in describing irregularities of the heart need some explanation. **Rhythm** means the successive intervals of time between the beats. When a beat is skipped such action is called intermittency; in some instances the heart is regular in its intermittency, but as a rule this is not so. **Arrhythmia** means that the intervals between the beats are very irregular. **Unstable rhythm** is the term applied when the heart easily changes its rate in rhythmic cadence. **Heart rate** is subject to great variations, especially in disease. The term **tachycardia** is used to denote excessive rapidity of action arising from lack of nerve control and is not due either to weakness of the heart muscle or the demands of the system. **Brady-**

**cardia** denotes an unusually slow rate owing to some form of autointoxication or some disease of the heart muscle.

The CAUSES OF IRREGULARITY may be grouped under three main heads: (*a*) toxic, (*b*) heart strain, (*c*) directly and indirectly through the nervous system.

(*a*) *Toxic causes* are numerous. Among such is tobacco, which has, in the author's opinion, been considered far too often as a cause simply because physicians have accepted it without seeking for an underlying cause, which is often organic disease. Tea, coffee, alcohol, and lead may produce irregularity. More frequent toxic causes are the absorption of toxins from the gastrointestinal tract and the presence of improper tissue waste, as is seen in the condition of lithæmia.

(*b*) *Heart Strain.*—Under this class the most numerous examples of irregularity occur. It may be considered the rule that if the heart is overtaxed from any cause, be it valvular disease, endarteritis or excessive intra-arterial tension, excessive physical exertion or prolonged overaction, that irregularity of action will result. This is especially so when the right heart is overtaxed as is the case in mitral disease.

(*c*) *Causes which Act through the Nervous System.*—The direct causes are chiefly organic disease of the brain and cord or neuritis of the vagus. Indirect causes are psychical, through the higher centres; or reflex from severe pain, which may make the heart irregular and slow.

Tachycardia is a condition not infrequently met with. It is quite incorrect to apply the term to every condition with very frequent heart action. It is a condition which should always be recognized if once seen. The heart's action is usually violent and often irregular, but it may be simply very frequent without undue force; the one thing which is most striking to the observer is the absence of any need for such action on the part of the heart. The causes of tachycardia have always some foundation. It may be seen after dissipation; it sometimes occurs in convalescents or in organic heart troubles. There is another peculiarity about this form of overaction in that it ceases suddenly, just as if the heart suddenly got in touch with its controlling centres. Bradycardia has by no means such an entity as tachycardia. It is sometimes seen after delivery, in convalescents, in children with worms, and in some forms of myocarditis. Neurasthenia and nerve exhaustion may be accompanied by slow heart.

The PHYSICAL SIGNS of irregular heart action are often peculiar. In simple intermittency the heart sounds do not cease during the interval, but the regular heart sounds are heard to the moment when the pulse is lost, when, as a rule, two abortive sounds are heard, which is fairly good proof that a beat is made, although it does not produce a pulsation at the wrist.

In arrhythmia and irregularity of force most of the beats are heard, but they are short and imperfect, and often the heart produces the idea of endeavoring to catch up with something going faster.

OTHER IRREGULARITIES OF THE HEART SOUNDS.—Sometimes when the pulse is slow there may be heard three sounds at the apex, owing to a reduplication of the first sound; in such an instance there is a good systolic contraction of the heart, followed instantly by another which is much shorter, and then follows the second sound. This usually means that the heart is very full of blood; one contraction does not empty the chambers, and then immediately follows a shorter, swifter contraction of the whole heart which completes the emptying process.

In some cases of slow heart the **right and left ventricles contract separately**; in such cases four sounds will be heard to every pulsation.

The so-called **gallop rhythm** is an interesting phenomenon which is not infrequent in hearts which are dilated from valvular lesion or overstrain. The first sound is good, then follows a weak sound, and finally a third which is more forcible than the second. The exact mechanism of this is not known; it is generally considered that the second sound is due to an imperfect contraction of one of the ventricles, and the third sound is the regular second sound, the other second sound being too weak to hear.

REDUPLICATION OF THE SECOND SOUNDS are not infrequent; the term is a misnomer, as there is no reduplication of the sounds, but the aortic and pulmonary elements are not heard as one sound, but are separated. This condition may occur if there is greater tension on one side or rather in one vessel than the other, as in mitral disease, which is a frequent cause of double sound over the pulmonary area. Sometimes the cause is a slight difference in the time of the contraction of the ventricles.

## THE PULSE.

**Elements of Examination.**—To judge of the pulse one should determine the condition of the wall of the vessel, the rhythm, and rate of the beat, the duration of the upstroke and of its decline, the length of the excursion, and the amount of blood in the vessel. The **condition of the vessel wall** is determined by palpation. In children and many young adults the wall of the radial pulse is not felt between the beats, but as a rule in adults a soft, cord-like sensation is appreciated. If much thickened or contracted the artery feels like a piece of macaroni; when **calcareous** degeneration has taken place, it feels beaded and like a chicken's windpipe.

The **duration and length of the excursion** would seem to be best determined by sphygmographic tracings, but while the study is fascinating and most of us have spent many hours over this method, yet the adaptation of the mechanism to the vessel allows of many variations, and the anatomical depth of the artery varies so much that the results are not satisfactory and few practitioners of experience trust more to tracings than to their own palpation of the vessel. Palpation is best made with the tips of the first two or three fingers with gentle, moderate, and forcible pressure; the **rate and rhythm of the pulse** are determined at the same time.

Nothing but experience can teach one the true character of the pulse. The normal pulse may show little on inspection, but in thin people and after exercise the temporal, radial, and cervical arteries may be seen to pulsate; the rate is found about 72 in the normal adult, but this has wide limits in either way; in children and infants it runs between 100 and 120. The rhythm is regular and the excursion is moderate.

The **abnormal pulse** presents many varieties; all require explanation as well as do the terms employed in the ordinary descriptions of the pulse. As regards the **rate** one may say it is fast, quick, rapid, or slow, but unless the rate is thus qualified the only single term to express it is by frequent or infrequent; when one says the pulse is fast, quick, rapid, or slow the **duration of the excursion** should be meant. By **tension** is meant the amount of blood pressure in the vessels. This is determined by the amount of force necessary to displace the blood in the vessel and obliterate the pulse wave. Experience is the

only true guide in ascertaining this correctly; beginners are often told that in a high-tensioned pulse, if the wave be stopped at some point nearer to the heart, a pulsation is still felt below this; in very high-tensioned pulses the anastomotic circulation does produce a pulsation below, but this is seldom. In the author's opinion the best way to judge tension is by very light, moderate, and forcible pressure. In a very low-tensioned pulse light pressure allows a good wave, but forcible pressure weakens the pulse; in medium tension medium pressure gives the best excursion of the pulse, while in very high tension of the pulse very forcible pressure, almost to the point of obliteration, gives the largest excursion and light pressure gives the smallest.

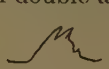
The **pulse rhythm** is of great importance. The **variable** or **unstable rate,** first fast and then slow, seldom means more than emotional or neurotic states, but may indicate pressure on the brain. The **intermittent pulse** which drops a beat occasionally does not necessarily mean more than a toxic cause or senile change. The **pulse of irregular force and frequency with intermittent action** is almost always an indication of grave valvular or muscular changes in the heart. The **hard, soft, weak, bad pulses** hardly require any description. The **water-hammer, shot,** or **Corrigan pulse** is one of sudden, quick, and long excursion with rapid fall—

in typical cases is diagnostic of aortic insufficiency, but sometimes in beginning fevers and marked nervous overaction and in senility the pulse resembles that of aortic insufficiency.

The **anacrotic pulse** with sloping tidal waves and ill-marked dicrotic notch—

is suggestive of aortic stenosis, but is often found in pulses of high tension.

The **bisferiens pulse** with double apical wave—



is sometimes found in aortic insufficiency with or without stenosis.

The **dicrotic pulse** with marked dicrotic notch and secondary wave—

is found in very low tension and relaxed condition of vessels, and means a rebound or recoil of the wave from the periphery.

**Tachycardia** is a term used for very violent and frequent heart action.

**Palpitation** is the same to a less degree.

**Bradycardia** is used to indicate a very infrequent heart action.

**Pulsus paradoxus** is the sudden cessation of the pulse sometimes occurring during forced inspiration.

## PERICARDITIS.

**Dry Pericarditis.**—In slight cases the only sign is the rubbing sound which is heard with maximum intensity in the fourth and fifth spaces just to the left of the sternum. Marked cases may give a palpable thrill or rubbing fremitus over the præcordium, a rather heaving, ill-defined apex beat, considerable increase in the area of superficial dulness, and friction sounds of wide extent, often well heard at the apex and over the base of the heart on each side of the sternum. The pulse is increased in frequency. There may be tenderness over the præcordium, with great pain.

**Pericarditis with Effusion.**—The **early signs** are usually those of localized dry pericarditis; **after the effusion** the pericardial murmur may disappear, but this is by no means always so particularly with the murmurs over the base. The most striking change is in the area of cardiac dulness, which becomes very broad at about the level of the fifth rib, extending to the right of the sternum for one or two inches as a rule, and sometimes reaches the anterior axillary line on the left; more important for diagnosis is the increased dulness upward in the median line a little to each side of the sternum; this is usually found as high as the second rib and sometimes as high as the first. In hypertrophy of the heart one may say almost positively that absolute dulness does not go higher than the upper border of the third rib. The dull area is extensive; as a rule the pulmonary resonance is abrupt, although it sometimes shades off. Bulging

of the præcordium is very marked in children; there may be bulging in the epigastrium and occasionally the spinal column is curved backward. The cardiac impulse becomes feeble or lost. Occasionally there is a good impulse at the left upper border in the third or fourth space which may be the apex or the right ventricle. The first rib is sometimes more prominent from displacement. A heaving wave is sometimes seen over the præcordium, especially at its upper left border. The heart sounds are feeble or lost at the apex, but are usually heard over the base along the left border of the dulness. The action is frequent and in many cases irregular. Besides the pericardial friction sounds, which are sometimes heard throughout the case, endocardial murmurs may be present, although even if present they are not always heard.

Certain **pulmonary signs during moist pericarditis** are important and interesting. In slight effusions no pulmonary change may be expected, but in large effusions, especially in children, there may be signs of compressed lung. Dulness, bronchial breathing, and voice are sometimes heard over the left anterior lobe close to the area of pericardial dulness, but more frequently than this a small spot of bronchial breathing and voice is heard posteriorly about the angle of the left scapula. Another sign which is sometimes found is a square patch of dulness at the extreme base of the left lung, about two inches vertically extending from the spine to a vertical line from the angle of the left scapula; this dulness is supposed to be due to the left lobe of the liver displaced backward. Feeble breathing over the left lung is frequent.

Dysphagia is occasionally present. The appearance of the patient is sometimes suggestive of pericarditis. The position assumed is one in which as little tension as possible is made on the præcordium. The patient looks anxious and is often cyanotic. Respirations are increased in frequency. The temperature may be high in severe cases. The pulse is frequent and often irregular.

There are practically only two **conditions to be differentiated from pericarditis with effusion.** (*a*) In some cases of hypertrophy and dilatation dulness may be very great, the heart impulse may be feeble or lost, and the thorax very thick. In such cases where there is marked dyspnœa and cardiac distress a diagnosis might be impossible. The points of difference

which can in most cases be determined are the greater area of dulness at the base of the heart and perhaps to the right of the sternum, and the loudness of the heart sounds along the upper left border which may be made out in pericarditis. To this may be added a friction sound and the history of acute onset, or of diseases which pericarditis may complicate. In hypertrophy and dilatation one can usually find an adequate cause or a good history.

(*b*) A sacculated pleurisy with effusion occurring above and to the left of the heart may resemble pericarditis with effusion at a certain period very closely. The outline of dulness may be the same. The main point of difference is in the position of the heart, which in pleuritic effusion is displaced to the right, where it may be seen to pulsate and where the sounds may be heard with maximum intensity. When either condition is seen to develop there could be no doubt in the diagnosis. A new-growth to the left and above the heart may produce similar signs to a sacculated pleurisy with effusion, and might be mistaken for pericarditis with effusion; but the points given in pleurisy are the same, while the history is one of slow growth in cases of new-growth.

**To differentiate dry pericarditis and pericarditis with effusion** might be difficult when the effusion is slight, but when at all marked the disappearance of the apex beat, the feeble or lost sounds at the apex, the higher position of the impulse and intensity of the sounds all point to effusion. The duration of the effusion is highly variable. It may last only a few days, but in well-marked cases it usually lasts two or three weeks and sometimes longer. Cases which die often have pulmonary complications, as double effusion or pneumonia. Death may be due to the great amount of effusion interfering with the heart's action.

**Tuberculous Pericarditis.**—Primary tuberculosis of the pericardium is very rare, but may occur. Most of the cases are secondary to pulmonary tuberculosis. The **physical signs** may be those of dry pericarditis or pericarditis with effusion; the fluid may be bloody. Inoculations of animals with it may produce tuberculous lesions. There is no tendency toward recovery.

**Pyopericardium** is very infrequent and gives the **physical signs** of an effusion, which may be scanty or very copious. The

friction murmur is usually absent. The diagnosis is difficult to make from the course of the disease. The exploratory needle is the only certain means of determining the nature of the fluid.

**Pneumopericardium.**—Infected wounds of the pericardium is the most common cause. Pyopericardium may produce gas in the sac. Extension of a suppurative process from ribs, pleura, liver, and peritoneum have occasioned it. There may be marked bulging of pericardium, a tympanitic or cracked-pot resonance, absence of apex beat or a diffuse heaving; the heart sounds are sometimes very loud; there are no true rubbing sounds, but often metallic ringing or chiming sounds.

**Hæmatopericardium.**—Traumatism, scurvy, purpura, leukocythæmia, rupture of heart, or aneurysm are the usual **causes.**

The **physical signs,** according to the cause, are those of a slow or rapid accumulation of fluid which the needle shows to be bloody.

**Malignant Growths of the Pericardium.**—Carcinoma and sarcoma are exceedingly rare; they are usually secondary or extend from pleura or mediastinum. There may or may not be fluid. There is increased dulness, perhaps a friction sound and feeble heart action.

The **diagnosis** is made from the signs elsewhere and general **symptoms.**

**Adherent pericardium** often follows dry or hydropericarditis and is of considerable clinical importance.

**Physical Signs.**—The whole præcordium may be depressed, but sometimes is bulged. The apex beat is diffuse and is farther to the left and upward; it is fixed and does not change with position. A systolic retraction of soft parts just at the apex or in the second, third, and fourth spaces close to the sternum is of importance. A systolic retraction of the soft parts posteriorly above and just below the short ribs, called "Broadbent's sign," is considered of more value; it is due to a tug on the diaphragm by the adherent heart, which is communicated to its attachments to the short ribs. The heart sounds may be muffled, but often there is a sharp, short, high-pitched first sound at the apex.

During inspiration there may be less respiratory movement on the left side anteriorly. There is sometimes sudden collapse of veins at root of neck during the ventricular diastole.

The pulse may be irregular and during inspiration sometimes stops. This is called the pulsus paradoxus; this is supposed to be due to fibrous cords encircling the aorta, which are set taught during inspiration.

The condition of adherent pericardium often exists with absolutely no physical signs or symptoms.

## CONGENITAL HEART LESIONS, ANOMALIES AND MALFORMATIONS.

**Clinical Significance.**—Most congenital cardiac defects are so serious that the infant dies a few hours or days after birth. Among such are cases of absence of auricular septum, absence of ventricular septum, absence of both ventricular and auricular septa, stenosis and atresia of aorta, transposition of primary arterial trunks, and deficiency of pericardium. There are, however, some congenital defects which may produce few symptoms and others which allow of life for many years, although usually fatal before adult life is reached.

**Patent foramen ovale** may be accompanied by no symptoms or physical signs, but sometimes there is a moderate cyanosis and some enlargement of the heart with increased frequency.

**Stenosis of the pulmonary artery** with patency of the foramen ovale and often with a communication of the aorta with both ventricles is one of the most important of all congenital lesions of the heart.

Clubbed fingers, marked cyanosis, malnutrition are almost always present. There is a marked overaction of the heart, with a diffuse, heaving beat; over the pulmonary area there is usually a systolic thrill and sometimes a diastolic with it; over this area and transmitted to the back is heard a harsh, rough systolic murmur, occasionally a diastolic; the pulmonary second sound is absent or faint. The apex beat is displaced to the left, but the most marked enlargement is of the right ventricle, with secondary congestion and enlargement of the liver. The lungs are poorly developed and yet seem usually in healthy condition. The veins of the neck sometimes pulsate.

**Atresia of the pulmonary artery** occurs in the course of the artery or at the valves, or the conus arteriosus is obliterated; there is usually auricular and ventricular communication, the lung is supplied with branches from the aorta or ductus arte-

riosus, the right ventricle is small and atrophic, and the left is much enlarged. There is usually great cyanosis; there may be a blowing systolic murmur over the præcordium; the second aortic sound is greatly accentuated; this may be heard with maximum intensity over the pulmonary area and be mistaken for that sound. These cases are very rare; they die in early infancy.

**Persistent ductus arteriosus** is not uncommon with other congenital lesions; it may be the only lesion and give few symptoms; very often, however, there is a thrill over the third and fourth spaces to the left of the sternum with a systolic murmur rough and harsh in character, transmitted upward and to the left; often there is a continuous diastolic murmur over the same area.

The second pulmonary sound is accentuated. There is some general enlargement of heart, with increased action; no cyanosis is present. These cases may live to a good age, but there is usually an inherent weakness which makes them the victim of the diseases of childhood.

## VALVULAR DISEASES OF THE RIGHT HEART (NOT CONGENITAL).

Valvular diseases of the right heart are comparatively infrequent, those of the tricuspid valve being almost always secondary to diseases of the mitral valve; primary lesions may be congenital; they are not very rare in childhood and may occur in adults.

**Tricuspid Stenosis.**—Cyanosis is usually marked; dilated and pulsating veins of the neck are usually but not always seen. The right heart shows enlargement. A presystolic thrill is sometimes felt in the fourth space to the right of the sternum, where a localized rough presystolic murmur is heard. Tricuspid insufficiency often accompanies this lesion as well as disease of the mitral valve, with its signs and symptoms. The liver is much enlarged in these cases.

**Tricuspid insufficiency** is almost always a relative affair, due to an enormously dilated right ventricle secondary to mitral lesions. Primary inflammation and destruction of the valves may occur. Cyanosis is usual, also pulsating veins of the neck; in all cases enlarged and sometimes pulsating liver, with ascites and dropsy of the lower extremities as a rule. The right

heart is much dilated and hypertrophied. There is a blowing systolic murmur, heard with maximum intensity at the end of the sternum or the fourth and fifth spaces to the right of the sternum, being carried somewhat to the right. A murmur is not always found. In primary cases the murmur may be heard in the right axilla or back. The signs of diseases of the mitral valve are usually present.

**Pulmonary stenosis** as a primary disease is due to thickening and adherence of the pulmonary valves; it is found congenitally also in childhood, but rarely in adults; it is frequently accompanied by insufficiency. There may be relative tricuspid insufficiency from great dilatation of the right ventricle, with its signs; the liver and spleen are always enlarged; ascites is sometimes present with dropsy of the lower extremities, the latter by no means always; there is enormous enlargement of the right ventricle, a coarse systolic thrill over the pulmonary area, with a very harsh, rough systolic murmur transmitted up and to the left; the second pulmonary sound is absent, faint, or replaced by a murmur when insufficiency is present. Cyanosis and clubbed fingers are usually seen. The pulse is frequent and small and often irregular.

**Pulmonary insufficiency** may accompany stenosis, the only additional signs being a diastolic thrill over the pulmonary area, with a diastolic murmur transmitted down along the left border of the sternum and sometimes toward the apex. When the lesion occurs by itself it is not so often congenital, but is usually produced by valvular inflammation in childhood and in adults; there may be a soft systolic murmur from roughening, with a diastolic murmur, as above described; a thrill is not present if the lesion is at all severe; the other signs are like those of pulmonary stenosis.

**Septic or malignant endocarditis** not uncommonly affects the right side of the heart, especially the pulmonary valves, but the symptoms of mechanical disturbance are not often a marked feature.

## VALVULAR DISEASES OF THE LEFT HEART.

Inflammation affecting the mitral and aortic valves may result in rendering them incompetent to close the orifices, or by thickening, adherence, and the formation of new tissue

may produce narrowing or stenosis. Degeneration of tissue from endarteritis in old age and some constitutional disturbances may also result in incompetency. The most frequent of all heart lesions are due to the first cause; the left side of the heart is usually attacked; the lesions in order of frequency are mitral insufficiency, aortic insufficiency, mitral stenosis, aortic stenosis. Mitral stenosis and aortic stenosis are, as a rule, accompanied by some insufficiency. Combined affections of the aortic and mitral valves are very common. In severe cases of all valvular lesions when compensation has failed we get many signs in common; frequent labored breathing is always common; dropsy is very common, but is seemingly rather capricious, for we find many of the worst cases of valvular lesions, mitral stenosis in particular, which go on to a fatal termination without ever producing dropsy; so that we cannot say that chronic congestion must produce it, but we are forced to believe that unknown toxins, the condition of the kidneys, the amount of hæmoglobin, or the state of the capillaries through nerve influences have a causative effect in cardiac dropsy. Congestion of the stomach and bowels, while common, produce in some cases vomiting and diarrhœa, but not in others. Ascites is frequent from portal congestion. Congestion of lungs is common, but in mitral stenosis is usually a very marked cause of symptoms. Small hæmoptysis is seldom seen in other valvular lesions, nor is brown induration of the lung as common. Bronchitis is very common; while hydrothorax may occur without any other dropsical condition, yet it is almost always a transudate. Congestion of the liver produces enlargement and nutmeg liver. Congestion of the brain produces headache and, in bad cases, delirium.

**Mitral Insufficiency.**—The **three cardinal points** are: a systolic murmur at the apex, transmitted to the left and often heard at the back in the seventh and eighth spaces; an increased transverse diameter of the heart; an accentuated second pulmonary sound.

Regarding the **systolic murmur**: if it is heard behind, one can be almost positive of the lesion; a functional murmur may be heard into the axilla; a localized murmur at the apex may be due to insufficiency; the absence of a murmur does not rule this lesion out, but if the heart's action is good it is indeed a rare thing for the murmur to be absent.

**Enlargement of both left and right ventricles** is usually marked, sometimes enormous; but the lesion is sometimes present and no evidence of enlargement is discovered, yet in these cases there probably is some enlargement which is a combination of hypertrophy and dilatation.

**Accentuated second pulmonary sound** is fairly constant, but in very slight cases it is not found and when the right ventricle is failing it may be weak. The pulse is about normal when compensation is good; when that fails it is frequent and irregular. In bad cases we may get secondary tricuspid insufficiency.

**Mitral Stenosis.**—A presystolic thrill and murmur; a short, sharp, high-pitched first sound at the apex; an accentuated pulmonary sound; an enlarged right ventricle and small, often irregular, pulse are the chief points in diagnosis. A soft, purring, definite presystolic thrill at and inside the apex is often quite sufficient to base a correct diagnosis upon, but one may be confused by the thrill in the so-called "Flint's thrill and murmur," which may occur in aortic insufficiency, or by a pericardial rub, or a systolic thrill. It has been said that a thrill may be present and no murmur, but not infrequently a murmur is heard and no thrill can be obtained; the thrill and murmur may both be absent. The presystolic murmur is unique and differs from all other heart murmurs. It is rough and rumbling, of varying intensity, sounding like r r r r - up, the up being the first sound. The accentuated first sound is as important as the murmur. The murmur is the most inconstant of all heart murmurs; the cause of its disappearance probably depends on the auricular contraction. A soft diastolic murmur may occasionally be heard at and inside the apex; this is supposed to be due to the negative pressure inside the ventricle at the moment of beginning diastole, coupled with a distended left auricle forcing the blood through a narrow opening. The first sound, short and high pitched at the apex, is generally thought to be due to the ease with which the left ventricle can empty itself, thus permitting a longer diastole and consequent mechanical advantage; but as one is struck by this same apparent phenomenon in aortic insufficiency accompanied by a Flint murmur, it would seem more probable that the coarse vibration of the auriculo-ventricular septum mechanically stimulates the nervomuscular mechanism of the heart and causes a short, violent contraction of the left ventricle. The second sound is often not heard at

the apex because the small volume of blood entering the aorta makes the aortic sound weak, and so it is not carried to the apex of the heart. The pulmonary sound is usually very high pitched, intense, and sometimes reduplicated; not infrequently it is not changed either from weakness of the right ventricle or owing to compensatory pulmonary emphysema, the lungs overlapping the heart. Cyanosis of the lips is very frequent. The pulse is usually very characteristic, frequent, small, soft, and often irregular; its size and frequency may be normal. It may feel hard because the vessel is contracted. The right heart can usually be made out to be enlarged, but not always. Mitral insufficiency very often accompanies this lesion and gives its signs. Bronchitis, brown induration of lungs, and enlarged liver are to be looked for, and in bad cases tricuspid insufficiency and its signs.

**Aortic Insufficiency.**—A diastolic murmur with variable points of maximum intensity, an occasional presystolic murmur, and a large, soft, quick pulse are the main points in the diagnosis.

Very often a correct diagnosis may be made by the throbbing exaggerated pulsation of the vessels of the neck and extremities; a capillary pulse is sometimes seen, but is not positively diagnostic of this condition. Great increase in the size of the left ventricle and a diffuse, wavy impulse are very suggestive of this lesion, but in slight cases the size of the heart may hardly be increased at all. There may be a systolic thrill or a slight presystolic when Flint's murmur is present. The most frequent point of maximum intensity of the murmur is in the fourth space just to the left of the sternum, but the maximum intensity may be over the aortic area, in the third left space, or at the apex.

The murmur is usually transmitted down toward the apex, but sometimes is localized; the murmur is usually of long duration and blowing, but may be rough or musical; the pulmonary second sound may be a little accentuated, but in mild cases, when the murmur is not heard over the aortic area, the aortic sound is sharp and accentuated; this must mean that the valves are flexible and not much affected.

A presystolic murmur heard at the apex, often called Flint's murmur, of varying length and intensity, due to the regurgitant stream from the aorta filling the ventricle and forcing one or

more of the mitral valves backward, thus producing an artificial stenosis or obstruction, is not uncommon; a large pulse with no great accentuation of the pulmonary sound or enlargement of the right ventricle distinguishes this from the murmur of mitral stenosis.

A systolic murmur with maximum intensity over the aortic area and carried into the large vessels very frequently goes with this lesion; this does not mean stenosis, but roughening of the valves. A systolic murmur heard at the apex and perhaps somewhat transmitted to the left is also of frequent occurrence; while this often means insufficiency from endocarditis of the mitral valve, it is frequently due to a relative insufficiency from dilatation of the left ventricle.

The large, frequent, quick pulse, as a rule, is by itself diagnostic, but many cases that are slight show a pulse which seems normal, though large; complicating lesions of the mitral valve make the pulse smaller and less regular.

Pallor is often more marked than cyanosis; the latter occurs only in the last stages, when the right heart fails and general chronic congestion takes place.

**Aortic Stenosis.**—This is a rare lesion; the chief signs are a systolic thrill and murmur over the aortic area, a large left ventricle, and a slow, infrequent, small pulse.

A thrill in the second right interspace, systolic in time, either soft or rough, is a valuable sign, but is by no means always present; and such a thrill does not always mean stenosis, as it is found in aneurysms and rough valves every now and then. A systolic murmur sometimes very rough, but often soft, transmitted into the large vessels of the neck, is a very constant sign.

The aortic sound is either soft or absent, never accentuated; the pulmonary sound is usually louder.

The left ventricle is always hypertrophied and dilated; there is a very heaving præcordial impulse, with often a very forcible thrusting apex beat; the first sound at the apex is usually long and impure; often there is a systolic murmur which may be transmitted from the aortic area or be due to relative insufficiency or endocarditis of the mitral valve. It is a frequent thing for a systolic murmur made at the aortic orifice to be heard at the apex, but save in very intense murmurs none are carried from the apex to the aortic area. A diastolic murmur from aortic

insufficiency frequently complicates this lesion. The pulse is usually characteristic; it is slow, of good force, infrequent, often below 60 to the minute; the excursion is small.

In bad cases there are symptoms of failure of the right heart.

## MIXED VALVULAR LESIONS OF THE HEART.

Mixed valvular cardiac lesions occur in all varieties of combinations, but the most frequent are aortic insufficiency and mitral insufficiency, although it must be understood that when stenosis of either valve occurs a double lesion of the same valve is most always present to some degree. The signs of aortic insufficiency are always definite in their meaning, but one is often puzzled, in mixed aortic and mitral insufficiency, as to whether the systolic murmur at the apex is due to endocarditis of the mitral valve or to relative insufficiency from the enlarged left ventricle and dilated auriculoventricular orifice. It is often impossible to determine this, but by determining the size of the right ventricle, the character of the second pulmonary sound, and the degree of transmission of the apical murmur, a fairly correct opinion can in most cases be made out.

In a bad mitral insufficiency, with much dilatation of the heart, accompanied by aortic insufficiency, it must be remembered that the character of the pulse of aortic insufficiency may be entirely lost, but as a rule, in this mixed lesion, while compensation is good, the pulse is always characteristic of aortic insufficiency.

When mitral stenosis is present with aortic insufficiency the pulse may be entirely robbed of its aortic character. It may be a very puzzling matter to find a case with a small pulse and a double murmur over the aortic area as well as a double murmur at the apex. In such a case the point to be determined is whether there is aortic stenosis and insufficiency with a Flint murmur at the apex, or aortic insufficiency and mitral stenosis. The key to this puzzle is the right side of the heart and the pulmonary second sound. If with these murmurs present and a small pulse we find a large left ventricle, little enlargement of the right, and a not unduly accentuated second pulmonary sound, the diagnosis of aortic insufficiency and stenosis should be made; but if the right heart is enlarged and the second pulmonary sound much accentuated, mitral stenosis must be

present. It must always be remembered that the accentuation of the second pulmonary sound is not always present in severe mitral lesion, but this means that the right heart is failing, and in such a case tricuspid insufficiency should be present.

In all severe cardiac lesions with failure of compensation, the pulse becomes rapid, feeble, and irregular, while the murmurs are apt to disappear, so that it becomes practically impossible to make a correct diagnosis from the physical signs.

## THE SENILE HEART.

The many indications of the effect of age on the heart cannot all be given, but the most frequent changes should be recognized. In subjects who have been vigorous and more or less accustomed to manual work or exercise, the heart is almost always enlarged, especially to the left. Murmurs are often heard. The most frequent is a systolic murmur heard over the aortic area and transmitted upward, with accentuation of the second aortic sound; this is most frequently due to atheroma or degeneration of the aortic valves or the arch of the aorta, which causes a roughening; occasionally a diastolic murmur from aortic insufficiency owing to degeneration and destruction of the valves is found.

A systolic murmur over the apex is not infrequent; this is probably, in most cases, due to relative insufficiency, but there are cases of degeneration of the mitral segments with insufficiency.

The pulse, as a rule, is very characteristic; it is large, full, and rather quick; it is frequently irregular. The wall of the vessel is almost always considerably thickened.

The cause of the increased size and strength is the natural result of a gradual fibrosis of the vessels; the quick character is due to the more intermittent flow of blood through tubes which are stiff and not uniformly elastic. The pulse often resembles that of aortic insufficiency.

In some senile hearts there is no hypertrophy of the heart, and the pulse simply becomes smaller and weaker.

The arterial wall in many cases is calcareous and beaded.

The patients suffer from dyspnœa on exertion and frequently are affected with emphysema and chronic bronchitis and chronic nephritis.

## MYOCARDITIS AND FATTY HEART.

In **myocarditis**, very frequently, there are no signs. It never occurs in childhood, rarely in young adults, most frequently in middle life; in old age it is a frequent senile change.

The heart is usually dilated and hypertrophied, its action is very irregular, the first sound is impure and snappy, and often there is a systolic murmur at the apex. The pulmonary sound is seldom accentuated until late in the disease, the aortic sound is usually loud and ringing, and there may be a systolic murmur over the aortic area from roughening of the aorta.

The pulse varies in size; it is irregular in frequency and force. As a rule some of the beats are large and some very small; the vessel is thickened and often there is some tension.

The lesions of emphysema of lungs, chronic bronchitis, and chronic endarteritis and nephritis frequently accompany it. There is much dyspnœa, especially on exertion.

**Fatty Heart.**—By this is meant fatty degeneration of the muscle and not simply fat outside of it. This also frequently gives no signs or symptoms. The patients are usually middle-aged, are obese, as a rule, sedentary in habits, and prone to alcohol.

The heart is seldom much increased in size; the first sound is muffled and the second sounds faint; murmurs are seldom heard; the pulse is soft, weak, and very irregular. There is not much dyspnœa except on exertion; there is seldom dropsy.

## HYPERTROPHY AND DILATATION OF THE HEART.

**Cardiac hypertrophy and dilatation without valvular lesion** usually accompany each other; dilatation in acute cases may occur alone, and slight enlargement can be due to hypertrophy only. When compensation is good hypertrophy is in excess, when it is failing dilatation is more marked. To distinguish between hypertrophy and dilatation is not difficult; the first shows a more forcible and more localized beat, a stronger and clearer first sound, and, as a rule, good second sounds; dilatation shows a diffused, floppy impulse and absent or uncertain apex beat, a weak, impure first sound, with sometimes a systolic murmur at apex; the second aortic sound may be weak and the pulmonary accentuated. The heart's action is usually very

irregular; there may be a gallop rhythm; the pulse is small, irregular, and soft; add to these the general signs of failure of compensation, and the picture is complete.

**Hypertrophy and Dilatation Due to Bodily Exercise.**—Severe and prolonged physical exercise for several hours may result in acute dilatation. There is marked dyspnœa, a very rapid and irregular pulse; increase in cardiac dulness may not be very great; the apex beat is displaced to the left, is feeble and diffuse; all the sounds are feeble and muffled. Very laborious, steady exertion causes simple increasing hypertrophy, and in time there may be palpitation and failure of compensation, which mends with rest and again breaks down after severe exercise.

**Hypertrophy and Dilatation Due to Excessive Eating and Drinking.**—Such cases are seen in the laboring classes who drink great quantities of beer and work hard. Hypertrophy and dilatation, with the former in excess, progresses for a long time before signs of failing compensation set in.

**Hypertrophy and Dilatation Due to Nervous Overaction.**—This is somewhat uncommon; there may be slight hypertrophy, but it is seldom of serious consequence.

**Hypertrophy and Dilatation Due to Poisons.**—Great overaction from alcohol or smoking results in hypertrophy and dilatation, but the latter as a cause is not common.

The overaction in Basedow's disease (exophthalmic goitre) always produces it.

**Hypertrophy and Dilatation due to Obstruction.**—This is found in arterial sclerosis, increased arterial tension, and aneurysms, the break-down of the heart being one of the most serious consequences in these troubles.

## THORACIC ANEURYSM.

There are many signs which are so pronounced and apparent that a glance is sufficient to determine the condition; other cases are so obscure and indefinite that they call for every aid in diagnosis.

**General Sign.** PULSATION.—This is of frequent occurrence in aneurysm of the aorta, innominate and subclavian arteries. When the aneurysm is from the anterior wall, it may be so slight that it is better seen than felt; at other times a definite localized pulsation or a diffuse heaving is felt.

Bulging.—This is diffuse or localized, forming a tumor which is expansile in all directions; such tumors gradually destroy and displace the soft and bony parts of the chest wall.

Thrills.—These are sometimes found when the aneurysm is neither visible nor palpable; they are usually systolic, but sometimes diastolic. They are more common in thin-walled aneurysms.

Pressure Signs.—These are the most valuable in obscure cases. Pressure on the veins produces at times œdema of neck and face; very often the veins are distended and enlarged; sometimes the superior vena cava is so obstructed that we see tremendous dilatations of the veins of the chest wall anastomosing with the veins which go to the inferior vena cava; pressure on the nerves, especially on the left recurrent laryngeal, causes paralysis of the adductor muscles of the vocal cord; pressure on the sympathetic produces dilatation of the pupil; this is most common on the left side from pressure by a subclavian aneurysm; pressure on the trachea produces stridulous breathing, cough, hæmoptysis, reflex laryngeal spasm, and dyspnœa; on the œsophagus, causes difficulty in swallowing; on the bones and nerves, very severe pain sometimes, but by no means always.

Tracheal Tug.—To obtain this, place the tip of the forefinger and thumb under the cricoid cartilage and try to lift the trachea, the head being held firmly but not unduly extended; the tug is a pull downward and is of value in aneurysms of the aorta pressing backward; when there is aortic insufficiency or marked overaction of heart, a slight tracheal tug is often felt.

Dulness.—This may be of great value when no pulsation or swelling can be detected, but there is no region in the chest where it is so difficult to determine whether a slight dulness means anything, as the upper part of sternum, because a thicker sternum or a less resonant chest or old pleuritic thickening produce a dull note; when there is marked dulness, if the lungs are normal, the only other possible trouble might be a mediastinal tumor or abscess which are very rare.

Murmurs.—There is no characteristic murmur of aneurysm and the absence of a murmur is not significant; the most common is a rough systolic heard with maximum intensity over the aneurysm and transmitted in the direction of the vessel and blood current; diastolic murmurs heard over aneurysms which are produced at the orifice of the sac are rare; such murmurs

are almost always made at the aortic orifice from insufficiency, and these are frequent; systolic murmurs heard with maximum intensity at the apex from relative mitral insufficiency are not infrequent.

Accentuated Aortic Sound.—No sign is of more value in obscure cases; its value becomes greater in proportion as we can eliminate other causes for it; we find it when the aortic valves are not implicated and may be present with a diastolic murmur, more common in fusiform than sacculated aneurysms, also common when an aneurysm blocks one of the large vessels; in large sacculated aneurysms the sound is often normal. The closure of aortic valves may be felt as a shock.

Size of the Heart.—This is not of much value in the diagnosis of aneurysms; we often get large sacculated aneurysms without hypertrophy and dilatation; but in fusiform aneurysms, in cases where the aortic valves are insufficient and where there is much atheroma and endarteritis there may be very marked hypertrophy and dilatation.

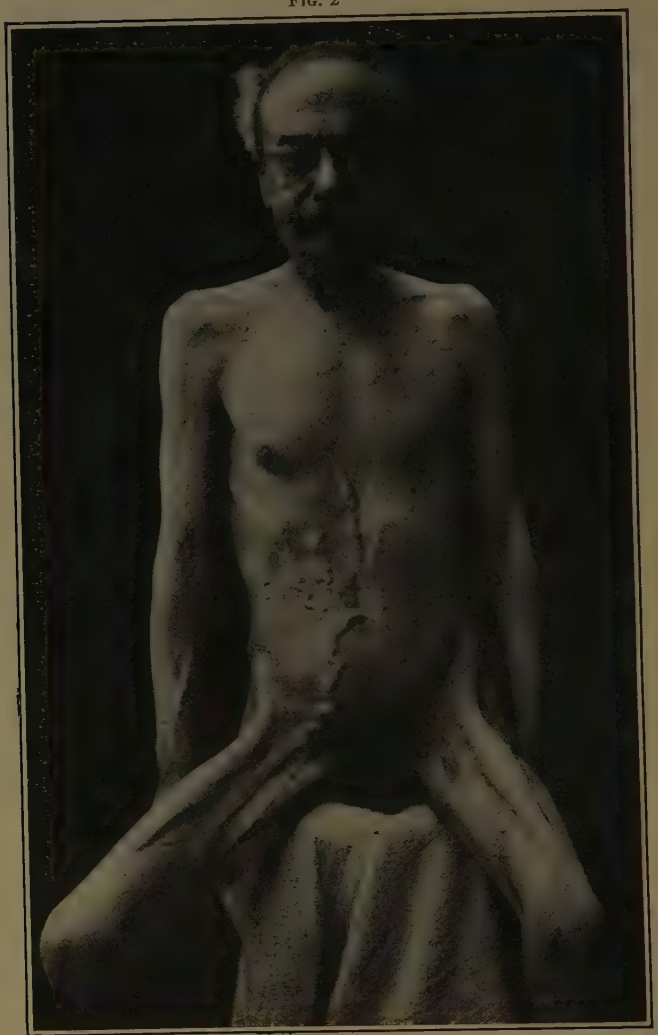
The Pulse.—Differences in the size of the radial pulses are frequent when the aneurysm obstructs the large vessel on one side; as a sign of value it is very little if taken alone, because anatomical differences in the radial pulses are very common; it is seldom of more than confirmatory evidence. Delay in the pulse of one side is almost pathognomonic, but it is very hard to detect and unless well marked is, therefore, not of practical value.

**Rupture of Aneurysms.**—The end often comes by rupture of the wall, most commonly externally, into the pleural cavity or lung, into the pericardial sac or under the fascia covering the abdominal aorta; the signs are those of sudden hemorrhage; the blood may be seen externally or be coughed up or be detected in the pleural cavity or by a big swelling in the abdomen.

**Site of Aneurysms.**—We determine the site mainly from the location of the tumor or of dulness, by pressure evidences, condition of the aortic valves, and the effect on the different pulses.

The most frequent situation of aneurysm is the first portion of the aorta, then the ascending and transverse, and third the transverse. The descending aorta is not often affected unless combined with the transverse. Where it is affected alone the diagnosis may be very hard to make. A pulsating tumor in the dorsal region to the left of the spine is sometimes seen, but

FIG. 2



Complete obliteration of superior vena cava by aneurysm of the transverse aorta, showing superficial veins of chest anastomosing with abdominal veins and emptying into femoral and iliac veins.

this is infrequent; pain from pressure on the vertebræ is usually present, but marked erosion may occur without pain. Pressure on the spinal cord is seen in rare cases. The heart often seems pushed forward and upward. The second aortic sound is usually accentuated. Rupture into the pleural cavity or under the fascia travelling into the abdomen is not infrequent.

The large vessels given off from the aorta are frequently involved by the growth of an aneurysm of the aorta. They are not infrequently affected in some portion of their course. The lumen of the vessel may be almost occluded by the deposition of fibrin on the inner wall of the aneurysm. It is in these cases that the pulse is sometimes stopped.

Aneurysms occasionally may be confounded with new-growths or abscesses in the mediastinum, but the latter are very rare unless from infection. Sometimes there is no sure way of differentiating a new-growth except by means of the *x*-rays.

## ANGINA PECTORIS.

Angina pectoris is a sudden paroxysmal disturbance of the heart's action and function, usually accompanied by severe dyspnœa, great pain, and apprehension of impending death. The disease is met with in two forms: (1) vasomotor angina or pseudoangina; (2) angina pectoris gravior or true angina pectoris.

1. **Vasomotor angina** may occur in early life, but is more common about the menopause; it may also occur at an advanced age. This affection is a neurosis of the cardiovascular system in which the peripheral vessels contract, causing a sudden strain on the heart, which may not be in normal condition owing to contraction of the coronary arteries. The affection occurs more frequently in neurotic subjects, women, and in mental workers who take little exercise. Disorders of the digestion may be the exciting cause of the attacks. The subjects of this form of angina often suffer from disorders of the peripheral circulation, such as "dead hands or fingers," cold extremities, with local sweating. Headache is often complained of. The heart shows no abnormal sign between the attacks. The onset is sudden, with pain and distress over the præcordium; the heart's action becomes frequent and dyspnœa becomes marked, although often there is more a sense of breathlessness rather than very labored

breathing. The pulse is found to be frequent, tense, and often irregular. The attack may last only a few seconds or minutes. The patient is usually restless and moves about. There is a great tendency to repetition of the attacks under similar conditions and at similar hours after they have once begun. The passing of abundant pale urine after such attacks is frequent. The subjects are liable to the attacks after once having suffered, but they do not necessarily continue.

2. **Angina Pectoris Gravior.**—In this affection there is always organic disease, either of the valves, muscle, or arteries of the heart. There may or may not be spasmodic contractions of the systemic vessels or of the coronary arteries during an attack. Men are more often attacked than women. It occurs most frequently between forty and sixty. Heredity tendencies are marked. The immediate cause of angina is often overexertion, mental or physical.

The onset is sudden. Pain of an agonizing, tearing character is felt about the præcordium; there may be the sensation of a heavy weight upon the chest. The pain in most cases radiates toward the left shoulder and down the left arm; occasionally it is felt to the right. Radiation is not essential. The face becomes pale and anxious, betraying great suffering and apprehension. Perspiration breaks out on forehead and the nose looks pinched and the lips livid. The patient immediately ceases doing what he had been engaged in and remains as still as possible, often avoids speaking. Dyspnœa is usually marked and the apparent air hunger is distressing to even look upon. The pulse may not be changed, but it is usually high tensioned, or soft, weak, and irregular. It is seldom very frequent. The heart sounds are impure and valvular.

The severity of the symptoms may only last a few minutes, but sometimes it recurs in wave-like paroxysm over the length of several hours. The stomach is usually distended with gas and may empty itself toward the end of the attack. After the attack immediate prostration is marked, but recovery from this is usually rapid.

The course of the disease is very variable; many patients only have one attack, from which they die; other cases one or more attacks, and after a time they do not recur.

The majority of patients have several attacks and die within about two years.

Those patients who show dilatation of heart from overstrain or fatty infiltration, or valvular diseases of heart with attacks of spasmodic contraction of vessels, are more hopeful than cases with marked myocardial changes or no evidences of disease of the heart, but which have marked degeneration of the coronary arteries.

The diagnosis of angina has to be made from hepatic, gastric, or renal colic, but the differentiation should present little difficulty.

Thrombosis of the pulmonary artery may present similar symptoms, but this usually occurs in younger subjects under certain circumstances. In these cases the dyspnœa is very severe and is followed by cough and the expectoration of bloody mucus or froth.

# CHAPTER III.

## DISEASES OF THE LUNGS.

### PHYSICAL SIGNS OF THE NORMAL LUNGS.

**Expansion.**—The increase in the circumference of the chest from inflation of the lungs is obtained by mensuration; we judge of the up-and-down motion and the filling of the apices mainly by the eye, though by placing the thumbs on the scapulæ posteriorly and the forefingers anteriorly under the clavicles we can judge fairly well of the apical expansion.

The degree of circumferential expansion in health is from one to about eight inches in adults, the average being about four; in women the upper portion of the chest expands relatively more than in men.

**Respirations.**—In adults the normal frequency is between 15 and 20 to the minute; at birth, about 45; between one and three years, 30 to 40; between three and five, 25 to 35.

**Fremitus.**—The spoken voice produces vibrations of the chest wall which can be felt by the hand held against the chest; in women and children this is slight, but in men, especially when the voice is deep and the chest walls not thick, it is very marked; it is most marked on the right side below the clavicle and in the supraspinous fossa; it is not well marked over the scapulæ below the spines, but is strong at the bases of the lungs below the angles of the scapulæ. It is more intense, as a rule, at the right base.

**Percussion Note.**—The best pulmonary resonance is obtained on the left side below the clavicle; on the right side anteriorly it is somewhat duller; posteriorly the resonance is good below the angle of the scapulæ; in the supraspinous fossæ and the interscapular region it is less resonant, and over the scapulæ quite dull; the size of the thorax, muscular development, and elasticity of the chest have marked influence on the quality and intensity of the note; thus in children where the chest is small and elastic

the note is not intense, and is higher in pitch; those who have large chests and thin muscles give intense low-pitched resonance.

**Breath Sounds.**—Over the trachea the inspiration is high pitched, intense, and tubular in quality; the expiration is longer and higher in pitch; much depends on the size of the trachea and the chink of the glottis in the production of these sounds, and it must be recognized that tracheal breathing differs in quality and in pitch in almost every subject; this breathing is heard over the large bronchi, especially anteriorly in the first space on the right side near the sternum, also posteriorly in the supraspinous fossa close to the median line and in the interscapular region; at these points it is usually mixed with vesicular sounds and is called bronchovesicular. Vesicular breathing is produced by the air passing from the terminal bronchi into the larger air spaces of the vesicles; it has a breezy, rough quality of varying intensity; there is scarcely any sound heard on expiration unless the bronchi are rough or much muscular effort is used to expel the air; the best and purest vesicular breathing is heard anteriorly on the left side, and posteriorly below the angles of the scapulæ. Prolonged vesicular expiration is found over some normal lungs.

**The Vocal Sounds.**—Over the trachea the voice is intense and bronchial; over the lungs, the nearer the large bronchi the louder is the voice; over remote parts of the lungs the voice is faint and not bronchial, but pulmonary in quality. The whisper is heard over the trachea and over the large bronchi, but is not heard over the distant portions of the lung.

## THE PULMONARY SIGNS IN DISEASE.

A proper conception of the character, meaning, and manner of production of normal and abnormal pulmonary signs can only be obtained by careful, unremitting, practical study; but hand-in-hand with this must go the theoretical study of such signs as presented by those who have made a serious study of them.

Expansion.—A moderate general diminution or increase from the average tells very little, but when we find an increase in the anteroposterior diameter of the chest with no lateral expansion, emphysema is the usual cause, but it is the one-sided and local differences that are most important.

At the apex on one or both sides we often discover lack of

expansion or retraction of the chest, especially noticeable during forced expansion; this almost invariably means a local tuberculous process in the pleura and lung; a bulging at these points means an aneurysm or new-growth.

At the base of the chest retraction is caused by an old pleurisy or empyema after the fluid has disappeared, or by a tuberculous process in the lung with breaking-down; a bulging is from pleurisy with effusion, empyema, pneumothorax, or a new-growth. Lack of expansion at the base may be due to any of the above conditions or from pneumonia. A general and often marked bulging on one side may be due to a large quantity of fluid, air in the pleural cavity, compensatory emphysema, or a new-growth. Great diminution of one side is usually from old empyema or pleurisy with effusion, or from tuberculosis of the lung.

Fremitus.—When the voice is high in pitch and of feeble intensity the fremitus is not well marked; thick chest walls also diminish it. Emphysema of the lungs causes general diminution; it is diminished or lost with fluid, pneumothorax, tumors, or greatly thickened pleura; it is increased in consolidation, marked infiltration, and cavities. Tumors and thickened pleura near large bronchi increase it.

Pulmonary Resonance.—The quality is pulmonary, the pitch is low, intensity and duration are considerable, but the pitch and intensity vary with the size and elasticity of the chest.

Hyperresonance.—The quality may be slightly tympanitic; the pitch is lower and the intensity and duration greater than in pulmonary resonance; in large, thin-walled chests this resonance is often normal; it is usually found on one side when the lung is larger from compensatory emphysema.

Dulness.—The quality is dull, the pitch high, and the duration short with diminished intensity; it is found over cavities, consolidation of the lung, infiltration, small amount of fluid, thickened pleura, and tumors.

Flatness.—The quality is flat, pitch very high, duration very short, slight intensity; it is found over large amounts of fluid, massive consolidation, cavities, and tumors.

Tympanitic Resonance.—The quality is tympanitic; pitch is high or low; intensity and duration may be slight or considerable. The variations in pitch, intensity, and duration of the sound depends on the size of cavities, thickness of their walls,

and tension of the air in them; low-pitched tympany is frequent over pneumothorax, and high pitched over cavities with thin walls; but tympanitic resonance is not necessarily due to air in cavities, but may be found over compensatory emphysema or where the normal lung has a background of consolidation or fluid. It may be normal.

Cracked-pot Resonance.—The quality has a clinking or cracked-pot sound; the pitch, intensity, and duration vary; it is best obtained by a sharp, forcible percussion, the mouth of the patient being held wide open with the ear of the examiner near by. In children and adults with thin-walled chests this resonance is sometimes found normally in front in the second and third spaces. The high-pitched cracked-pot resonance is best obtained over thin-walled cavities which connect with a large bronchus; it is occasionally obtained over consolidation close to a large bronchus.

Amphoric Resonance.—The quality is musical, almost bell-like; the pitch, intensity, and duration vary; best examples are found over pneumothorax and very thin-walled cavities.

**Breath Sounds.** Tubular Breathing.—The quality is hollow and musical; the pitch varies with the size of the trachea, chink of the glottis, and force of the air current; it is seldom very high and may be quite low; the intensity also varies; the expiration is longer than inspiration and may be higher in pitch. This breathing is heard normally over the trachea and diminishes in intensity over the large bronchi. We sometimes hear good tubular breathing over cavities and consolidation.

Vesicular Breathing.—This is produced by the rushing of the air through the terminal bronchi into the larger air spaces; the quality is breezy and interrupted; the pitch is fairly high; the intensity is not great; inspiration is much longer than expiration and may be the only phase of this breathing; the quality varies with the age and elasticity of the lung; in the very young it is very rough, and such breathing is known as puerile; in the old and emphysematous, vesicular breathing is smoother and higher in pitch.

Bronchovesicular Breathing.—This is a combination of tracheal or tubular breathing and vesicular.

In many subjects, especially where the chest wall is thin, this breathing is heard above the clavicles and the inner part of the first space, in the supraspinous fossa, and the interscapular

region; it may also be heard in such abnormal conditions as partial consolidations and infiltrations, especially when near the large bronchi, it can readily be seen that such breathing may be very confusing at times.

Bronchial Breathing.—The quality is nasal and flat; the pitch is medium; the intensity and duration vary; expiration is usually longer than inspiration and more intense; it is the quality above everything else which distinguishes this breathing; it is often heard on expiration only, and sometimes only on inspiration; much confusion exists between this breathing and tubular; the sound itself is quite different in quality, tubular being somewhat musical; it is true that they may mean the same thing, but true bronchial breathing is never heard normally at any point over the lungs, and always indicates either consolidation, a cavity, or compressed lung.

Cavernous Breathing.—It is very similar to bronchial; the quality is more reverberating and hollow and the pitch is lower; it is heard over cavities, and sometimes over consolidation.

Amphoric Breathing.—This differs from cavernous in quality only, being a pure musical tone, somewhat like blowing over the mouth of a wide-necked bottle; it is found over pneumothorax and cavities.

**Vocal Sounds.** Pulmonary Voice.—Much depends on the quality and depth of the voice as to how well it is heard over the lungs; normally it is quite intense near the large bronchi; it gradually becomes quite faint toward the bases of the lungs. A simple increase in the intensity of the voice is found in infiltrations, interstitial and incomplete pneumonia; diminished voice is found in emphysema, some cases of thickened pleura, and small amounts of fluid.

Bronchial Voice.—The quality is more nasal than pulmonary, the pitch is higher, and the intensity and duration are variable; it is heard over consolidation, cavities, and compressed lung.

Cavernous Voice.—The quality is reverberating and hollow; the pitch is lower than bronchial; the intensity and duration are considerable; it is heard over cavities and sometimes over consolidation.

Egophany.—This resembles bronchial voice, but is more nasal, sometimes quite bleating; when heard it is usually over fluid; the bronchial voice from a compressed portion of lung has its tone modified by passing through fluid and becomes

egophany; egophany is sometimes heard over tumors or large exudates of fibrin.

Pulmonary Whisper—Normally the whisper is heard near the large bronchi, but is never heard over the remote portions of the lung.

Bronchial Whisper.—This is louder and clearer than pulmonary whisper; it is heard over cavities, consolidation, and compressed lung.

Cavernous Whisper.—This is often more pronounced and characteristic than cavernous voice; the reverberating quality is well brought out in cavities and is never heard over any other condition.

**Adventitious Sounds.**—These are made between the surfaces of the pleura, in the bronchial tubes, and in lung cavities; some are characteristic of one or of the other, and some are common to both.

Made in the Bronchi and in Lung Cavities.—Sonorous and sibilant breathing or rales are piping, musical sounds; the former are low and the latter high in pitch; they are usually continuous and more marked during expiration; they are always caused by a narrowing at some point in the bronchi, either from spasm of the muscular wall or from congestion or the presence of mucus in the lumen.

*Mucous Rales.*—These are loud, large, very moist sounds heard in inspiration and expiration, caused by thin mucus in the tubes; they are always found in marked œdema of lungs and bronchitis of every type, and sometimes in hæmoptysis.

*Gargling or Bubbling Rales.*—These are very loud and moist and have a gargling sequence; they are made in cavities with a bronchus opening under the fluid in the cavity which allows air to enter.

*Rattling Liquid Metallic Rales.*—These are very moist, rattling, metallic sounds, made in small and large cavities during the act of coughing.

Adventitious Sounds Made Only in the Pleura. *Rubbing Sounds.*—These sound superficial; they are grazing or creaking, often leathery in quality; their size and intensity vary greatly; such sounds are always abrupt and not well rounded, but catchy; they are never musical and always have a definite relation to the degree of lung expansion. They are made on inspiration and expiration.

*Succussion.*—This is a splashing sound made in hydropneumothorax when the chest is suddenly shaken.

Adventitious Sounds Which May be Made Both in Pleura and Lung. *Crepitant Rales.*—These are fine, dry, crackling sounds heard toward the end of inspiration, usually bursting out in a shower; they are sometimes heard on expiration, especially above the clavicle; they are formed by the breaking of soft bands of fresh fibrin by the separation of surfaces of the pleura, or by mucus or serum in the terminal bronchi which permits air during forced inspiration to enter the vesicles. When the lung is nearly consolidated these rales sound much drier, but it is not necessary that the lung be consolidated; crepitant rales are heard in dry pleurisy, congestion of lung, consolidation, and in beginning œdema.

*Subcrepitant Rales.*—These are the most frequent of all rales; they vary in size, usually fine and moist, heard at any time during respiration, commonly made in the bronchi, but they can be made in the pleura by the rubbing of moist fibrin between its surfaces. Much depends on the medium as to the exact size and quality of the subcrepitant rale; in bronchitis they are usually heard on inspiration and expiration, but the size of the rale varies with the size of the bronchi in which they are made; when the lung is partially consolidated the rale is drier and more superficial; when the bases of the lung are congested and œdematous a bunch of fine subcrepitant rales may be heard at the beginning of inspiration; when there is infiltration near a large bronchus or small cavity, particularly at the apices of the lung, in the supraspinous fossa and interscapular region, mucus in a bronchus, especially if it is very tenacious and sticky, often causes very loud, resonant rales with a sounding-board quality and overlapping sequence; they often have a vibratory quality as well, and may be mistaken for the sounds of pleuritic adhesions. These rales are often termed *consonating.*

Subcrepitant rales at the apices, when due to mucus in the fine bronchi from tuberculous inflammation, are best heard during coughing or the first vigorous inspiration after coughing.

*Metallic Tinkle.*—This is a musical metallic tinkling sound due to the dropping of fluid into a cavity which contains air and fluid; this is most common in hydropneumothorax or pyopneumothorax, but is not uncommon in large cavities.

## CHAPTER IV.

### DISEASES OF THE PLEURA.

#### PLEURISY.

**Acute Dry Pleurisy.**—It is a very common affection; it is usually localized at the base posteriorly or in the subaxillary or mammary region, but may occur at any point; it is sometimes general over one lung, and may affect both sides at the same time; ordinarily the inflammatory deposit is not very great, but it is by no means uncommon to have a deposit several centimetres thick. In slight cases there may be no signs but a bunch of crepitant rales during inspiration, or rubbing friction sounds on inspiration and expiration; in more marked cases there is restricted expansion of one side with a sudden catch from pain, slight impairment of resonance, feeble breathing, and extensive crepitant rales or rubbing sounds. Subcrepitant rales may sometimes be heard; the voice and fremitus may be slightly increased near a large bronchus and diminished elsewhere. In very marked cases there is greatly restricted expansion on one side, with exaggeration of the movements of the other chest; marked dulness or flatness, lost breath sounds, and diminished or lost fremitus and voice; in such cases friction sounds may be less marked owing to the limited movement of the chest; occasionally, if the lung is compressed to consolidation, there is bronchial breathing and egophony over the exudate. The signs of acute dry pleurisy disappear in a few days to two or three weeks and are succeeded by a return to normal conditions; but very frequently there is left slight dulness, diminished expansion, and breath sounds, with increased voice and fremitus near a large bronchus and diminished elsewhere, or the disease does not cease and we have the signs of—

**Chronic Dry Pleurisy.**—The restricted expansion of one side increases, as well as the dulness; friction sound and subcrepitant rales may persist for an indefinite time, but these are apt to cease owing to the lost expansion and total obliteration of the pleural cavity; chronic inflammation is usually set up in the

underlying compressed lung, and we get the signs of chronic interstitial pneumonia, such as great flatness, bronchial or tubular breathing, bronchial voice, subcrepitant and coarse sonorous or mucous rales. Bronchiectatic cavities may be formed, with the added signs characteristic of them.

**Pleurisy with Effusion.**—The amount of effusion varies greatly and it is on this account mainly that the signs are so confusing; most commonly the effusion is on one side, occupying the lower half of the chest; sometimes both chests are moderately affected at the same time, but it is very rare that both sides are severely affected together. It is only by a thorough study of the mechanics and physics of this condition that a proper conception of the signs can be obtained, to facilitate this it is best to take up the study according to the amount of fluid.

A small amount of fluid at the base may show nothing on inspection; sometimes there is restricted expansion; dulness can always be obtained with diminished or lost breath and vocal sounds. If there is any mucus in the lung and enough air gets in to disturb it, subcrepitant and occasionally crepitant rales are heard over the fluid. We may get above the level of the fluid the signs of dry pleurisy, but as a general rule no adventitious sounds are heard.

A moderate amount of fluid—say, to the angle of the scapula—differs from the former in showing, especially in children, a bulging of that side of the chest with restricted movement; flatness is more marked; breath sounds are lost, or there may be faint bronchial breathing; vocal sounds are slightly nasal, or there may be marked egophony; the whisper may be bronchial, but usually is not heard; if the fluid is on the left side the apex of the heart may be somewhat displaced toward the right; the shadow of the diaphragm is not seen to move.

A marked effusion—say, up to the spine of the scapula—shows more marked bulging; considerable displacement of the heart to the opposite side, especially when the effusion is on the left side; bronchial breathing and egophony at and below the level of the fluid are fairly constant, but breathing and voice may be absent or diminished.

*One Side of Chest Full of Fluid.*—There is very marked bulging and no movement of the affected side; great displacement of the heart, which may occupy a corresponding position on the right side if the fluid is on the left; there is absolute flatness over

the whole side, lost fremitus and breath sounds; the voice may be bronchial or egophonic in the interscapular region and in the first and second spaces near the sternum; over the rest of the chest it is diminished, with some nasal quality.

We must always consider the signs above the level of the fluid and of the opposite side in every case; much depends on the amount of fluid; in small amounts very little change may be detected, but as the amount increases we get increasing evidences of compensatory emphysema on the opposite side; these are hyperresonance, some increase in size of chest, the sign of most value being exaggerated breath sounds. Above the level of the fluid the signs are quite variable; the fremitus is increased; the resonance is usually impaired, but very often under the clavicle the resonance is quite tympanitic of medium pitch; this is the so-called Skodaic resonance. The breath sounds are usually diminished, but are sometimes exaggerated; the voice is increased; the signs of bronchitis or dry pleurisy are sometimes found.

The most confusing phenomenon is the variability of bronchial breathing and egophony in different cases with similar amounts of fluid; this is not hard to explain. These signs depend on compression of the lung; if previous adhesions have been formed the lung cannot float up on top of the fluid, but is held down and compressed; in such cases a very small amount of fluid gives egophony and bronchial breathing. In cases where the lung is free we still find bronchial breathing in one case and not in another with similar amounts of fluid; the cause of such a difference in these cases is the way in which the lobes accommodate themselves to pressure; in one case the lower lobe will be compressed to a solid, while the upper remains in normal condition or becomes compensatorily emphysematous; in another case both lobes share in the compression, both are semicompressed; in the first instance bronchial breathing is quite marked, even when the fluid is not so very excessive; in the latter instance breathing is restricted and diminished, but may never become bronchial, even with a large quantity of fluid. The question is often raised as to why voice and breathing are not normally heard over fluid, which is a good conductor of sound; vesicular breathing is not heard because the air vesicles adjacent to the fluid do not expand and do not produce sound, nor does the lung when semicompressed act as a good conductor of sound which is made nearby. The voice, contrary to the usual

teaching, is almost always heard; it usually sounds clearer, but is of lessened intensity; it is clearer because the coarse, jarring fremitus is removed; it is fainter because the sound is deflected to some extent by the bending of the terminal bronchi, owing to compression by the fluid.

Egophony is somewhat difficult to explain satisfactorily; the ordinary voice is made up of mixed tones; bronchial voice is that which is usually heard over the trachea; when such a sound passes through fluid the lower tones are deadened and the higher accentuated, and thus it is that egophony is produced; it is high in pitch, bleating or nasal in quality. The nature of the cough may help us in fluid; usually there is oppressed breathing and the cough seems that of dyspnœa and mechanical compression, and not due to the presence of mucus.

**Tuberculous Pleurisy.**—The old teachings laid great stress on the presence of a bloody effusion as almost essential to a tuberculous pleurisy, and of late years, especially among the German clinicians, every pleurisy has been considered tuberculous. We now know that pleurisies may be caused by traumatism, exposure to cold, influenza, rheumatism, pneumonia, typhoid fever, septicæmia, etc. We consider pleurisies tuberculous when we can rule out the above causes, when the disease persists longer than a few weeks, when the fluid is bloody, providing there is no malignant growth of the pleura, when tuberculous changes are discovered in the lung, when the tuberculin reaction is obtained, and when inoculation of the fluid causes tuberculosis in animals.

The physical signs are essentially the same as pleurisy with effusion or chronic dry pleurisy.

We must always be on the lookout for tuberculous changes at the apices, especially at the one opposite to the fluid.

## EMPYEMA.

The physical signs of a collection of pus free in the pleural cavity may differ in no respect from serous fluid. In infants and very young children an effusion is more frequently purulent.

Pus is not uncommonly sacculated; such collections are found posteriorly at any point below the spine of the scapula, in the axillary, subaxillary, and mammary region; sometimes there is bulging at the point of accumulation; always dulness or flatness;

lost or diminished fremitus; lost or bronchial breathing; diminished voice or egophony; occasionally when the collection is in contact with the pericardium pulsation of the fluid is felt; the signs bordering on the fluid are usually those of dry pleurisy. Sacculated pus is practically never found above the second rib.

## PNEUMOTHORAX.

The signs usually depend on the amount of air, the presence or absence of free communication of the opening in the lung with the air cavity, whether the air is free or sacculated.

In acute cases we notice the urgent dyspnœa, bulging and immobility of the affected side, with exaggerated movement of the side opposite; fremitus is lost; the resonance is either exaggerated, tympanitic, or amphoric. The breath sounds are lost or amphoric. The voice is lost or feeble. The cough may produce a metallic sound of rushing air which is rather characteristic. By striking one coin against another at some point over the air and listening with the ear on the chest at an opposite point, a clear, bell-like sound is heard. There is usually marked displacement of the heart. Sacculated air gives practically the same signs, but limited to a certain area; the signs are never as pronounced, simply because the amount of air in the pleural cavity is small; in addition there are always found extensive adhesive pleurisy and tuberculous inflammation on the same side.

## PYOPNEUMOTHORAX OR HYDROPNEUMOTHORAX.

When fluid is free in the same cavity with air the signs are very characteristic. There is a shifting area of dulness or flatness which is always marked at the point of the chest most dependent; over this area the breath and vocal sounds are lost. On suddenly shaking the body, if the ear is held against the chest wall, and often at some distance, a splashing sound called succussion is heard; very frequently the dropping of fluid from a point above produces a metallic musical sound called the metallic tinkle; this sound, however, may not depend on the dropping of fluid, for moist rales which may be made in the lung sound musical and metallic. Above the fluid the signs are those of pneumothorax.

### SIGNS LEFT BY LONG-CONTINUED PLEURISY WITH EFFUSION OR EMPYEMA.

Very frequently rebellious serous effusions or neglected empyema result in great retraction of the chest wall on the affected side, with bulging of the opposite; the heart is drawn over to the affected side unless adhesions have retained it in the position where it was displaced by the original fluid. On the affected side fremitus is usually diminished, though perhaps increased near the large bronchi; the voice is diminished and the breath sounds are lost. The spine may be curved, with its convexity toward the affected side. The opposite lung gives all the signs of compensatory emphysema.

### NEW-GROWTHS IN THE PLEURA.

The signs are usually those of sacculated fluid, but not infrequently a serous or bloody effusion accompanies the growth, and under these circumstances the signs are those of an effusion, the signs from the growth itself not being at all apparent. The diagnosis is made on the history of the case, the character of the fluid, and results obtained by the tuberculin or inoculation tests.

### SYPHILITIC AFFECTIONS OF THE PLEURA.

These take the form of a chronic thickening of the pleura which is diffuse or circumscribed, or of local gummata which may also involve the lung. The signs in the latter case are those of localized or sacculated pleurisy.

### DIFFERENTIAL DIAGNOSIS OF PLEURISY.

Very little difficulty will be experienced in making the **diagnosis of dry pleurisy,** unless diaphragmatic, when the diagnosis may be impossible. Diaphragmatic pleurisy, however, is rare by itself. In any case with acute localized pain in the side it may be put down, as a rule, that if due to pleurisy the crepitant rale or friction sound can always be heard unless there is no movement of the chest wall at all. When there is no friction sound the diagnosis is either rheumatic, neuralgic, or syphilitic, or due to some condition in the abdomen.

To differentiate effusions from pneumonia, see under that affection.

Large fibrinous exudates are difficult to distinguish from pleurisy with effusion, and in many cases impossible. The presence of universal friction sounds over the dull area is in favor of dry pleurisy, but there may be a little fluid at the bases or in small sacculations in spite of *rubbing sounds*, which may be transmitted through fluid if made nearby. In large fibrinous exudates rubbing sounds often disappear because of firm adhesions or lack of movement in the affected side; there may be a slight bronchial element to breathing, with some nasal tones in voice; in judging these cases one can only go on probabilities, which are always in favor of fluid.

To distinguish between fluid and thickened pleura with markedly compressed lung left after fluid has been absorbed is a much more frequent proposition than the former. In the latter there is marked dulness, feeble or lost breathing, and, as a rule, absence of rales, although sometimes when fluid disappears rubbing sounds are heard which, of course, make the diagnosis clear, but without these the presence of retraction of that side or displaced heart to same side points to the absence of fluid. Displacement of the heart to the opposite side does not always mean fluid, as old adhesions may bind it in the position originally caused by fluid, even after the latter has entirely disappeared.

The **difference between fluid and a new-growth in the pleura** is often not apparent, but new-growths without fluid in the pleural cavity give the signs of sacculated fluid and often present more bulging than fluid; they are not so frequently accompanied by cough, they slowly increase in size, and there may be cachexia and the presence of new-growths elsewhere.

The **difference between serous and purulent effusions** cannot be determined by the signs. In empyema there is more likelihood of sacculation. It is more common in children and in adults after pneumonia. The temperature curve may suggest pus. Pulsation over the fluid means pus in almost every case.

Affections of the liver may easily be mistaken for effusion into the pleural cavity.

Abscess of the liver which enlarges the liver upward, pointing toward the diaphragm or thoracic wall, produces flatness, feeble or lost breathing at the base of the right chest. The border of

the dulness is seldom as level as that of pleurisy; it is more abrupt, the breath sounds above the dulness are usually better than in fluid, and rales are seldom present, although this fact is not of positive value. Bulging nearer the costal margin may be marked in abscess. In abscess the history of diarrhœa or of being in a tropical or semitropical region, the yellowish tinge of the skin, and, perhaps, irregularity of fever with possible chills are of great value in diagnosis. The aspirating needle must be employed to establish the diagnosis.

Cirrhosis of the liver may give increase of dulness upward and feeble breathing, but enlargement of the liver downward and other general signs make the diagnosis easy.

Syphilitic cirrhosis or gummata on the upper surface of the liver may cause considerable dulness at the base of the right chest; the dulness conforms to the general shape of the liver; there is no cough. Breath sounds are good and no friction sounds are heard. Other syphilitic evidences or history are usually present.

Echinococcus cyst of the liver may produce great dulness at the right base, but it is usually dome shaped. There are no general symptoms of pleurisy. The needle usually has to be used to establish the diagnosis. Salty, watery fluid containing hooklets or membrane make the diagnosis.

The employment of the aspirating needle and of cytodiagnosis are final steps in the diagnosis of all pleural effusions.

# CHAPTER V.

## DISEASES OF THE BRONCHI AND AIR VESICLES.

### BRONCHITIS.

**Acute Bronchitis.**—Mild cases with the trachea and large bronchi affected may show no signs. Moderately severe cases give sonorous and sibilant rales pretty generally, though inconstant, being first in one place and then in another. At the base subcrepitant rales are usually heard, both on inspiration and expiration; the signs are usually on both sides, but sometimes only on one; sibilant and sonorous rales may be absent.

Severe bronchitis gives very marked sibilant and sonorous rales all over, large and medium-sized mucous rales, with many fine subcrepitant rales all over, but most marked at the bases; there is very evident dyspnœa. Vesicular sounds are feeble or obscured by the rales.

Coughing is severe according to the case.

**Chronic Bronchitis.**—There is usually slight dyspnœa; sonorous, sibilant, and mucous rales are usually present, with subcrepitant rales at the bases; it must be remembered that chronic bronchitis is not often a disease by itself, but usually accompanies emphysema of the lungs, valvular diseases of the heart, and chronic Bright's disease. In long-continued cases of chronic bronchitis dilatations of the bronchi may occur; these often give no signs especially if central; if near the surface there may be tubular breathing, increased voice, and very loud mucous or gurgling rales; these signs with the history of large amounts of periodical expectoration confirm the diagnosis. The cough is apt to be in spells. Fetid breath from putrefaction of the sputa is not uncommon.

### BRONCHIAL ASTHMA.

In paroxysmal attacks most distressing dyspnœa is noticed; all the extraordinary muscles of respiration are brought violently into play; there may be cyanosis, with an anxious expression to the face. The intercostal spaces sink in during inspiration; the

patient sits up and leans forward, unable to lie in the recumbent position. Resonance is usually higher in pitch and often somewhat tympanitic; the breath sounds are usually obscured by numerous sibilant and sonorous rales, which are heard during inspiration and expiration, being more marked in the latter. Between the attacks the lungs may be normal, but in many chronic cases the signs of chronic bronchitis and emphysema supervene.

## EMPHYSEMA OF THE LUNGS.

The shape of the chest is sometimes characteristic; it is rounder, the anteroposterior diameter is increased, occasionally it looks barrel-shaped, but frequently there is no change in the shape. The sternocleidomastoid muscles and their tendinous attachments are often greatly hypertrophied; the clavicles may be bowed outward to a great degree; the heart is lower from being pushed down; the apex beat is usually obscured; epigastric pulsation is apt to be marked. Dyspnœa is usually evident, the intercostal spaces may sink in during inspiration, and the descent of the diaphragm is lessened. The expansion is diminished laterally and increased up and down. The percussion note is higher in pitch, wooden or tympanitic in quality; it may, however, be quite normal. The pulmonary resonance usually obscures the heart dulness. Changes in the vesicular murmur are the most common and important of all signs; as a rule breath sounds are much diminished all over, although the part of the lung most affected varies, usually most marked at the bases; but one side may be more affected than the other, or the change may be confined to one lobe. The next most common variety of breathing is a smooth, high-pitched inspiration; the least common breathing shows prolonged low-pitched expiration; the breathing is never normal save in very slight cases. The voice and fremitus are usually diminished. Sibilant and sonorous rales are frequent, especially on expiration; subcrepitant rales are common at the bases; very often a bunch of fine, dryish rales, during inspiration only, are heard over the lower part of the lungs, being most marked about the middle third of inspiration; these are due to stasis.

There may be no adventitious sounds. Cough is severe in the morning and on exertion. The heart is enlarged and pushed downward; all the sounds, especially those over the base, may

be diminished owing to the overlapping of the lung; *the second pulmonary sound is not increased*, the aortic sound is sometimes sharp, but only when arterial or kidney changes have taken place. Bronchitis and asthma often complicate this disease.

The face often looks distressed. The skin may be somewhat cyanotic. There may be signs of heart insufficiency and general dropsy in bad cases.

Nephritis, arterial sclerosis, and cirrhosis of the liver are often accompanying lesions.

## ŒDEMA OF THE LUNGS.

Œdema of the lungs is not infrequent in cardiac diseases, and may be sudden and temporary or at the end of most cases which do not die suddenly. It is a frequent ending of all acute pulmonary inflammations. In some cases it follows exposure or prolonged exertion. In the latter instances or in some cases of sudden heart insufficiency the signs are seen at their best advantage. Dyspnœa and pulmonary distress are immediately felt. The first pulmonary signs are universal crepitant rales which pass from fine to medium size, and then moist, subcrepitant appear, followed by loud mucous and sonorous sounds all over the lungs. The vesicular sounds are diminished from the first and soon become lost. Cough occurs early and soon becomes very distressing; it is not a deep cough, but a constant clearing effort. The face becomes anxious and then cyanotic. The heart is at first rapid, later becomes irregular, and may finally become slow, but usually gets more frequent and weaker until the end.

## BRONCHOPNEUMONIA.

Infants and young children suffer from this affection, especially as a complication of the infectious diseases; it may occur in adults, but is uncommon. At the onset breathing is somewhat hurried; sibilant, sonorous, and subcrepitant rales are heard in different parts of the chest, being most marked posteriorly at the bases. As the disease advances, and areas of peribronchial exudate and consolidation take place, there may be increased fremitus, which is of little value in children on account of the difficulty in appreciating it; slight general dulness may be found, but often in areas, which are more common over the lower half

of the chest posteriorly; over these spots breathing is changed, the inspiration is diminished, and the expiration is short, high pitched, and bronchial in quality; bronchial breathing may sometimes be heard, both on inspiration and expiration; the voice is higher in pitch and often quite bronchial over the consolidated areas; there are usually sibilant and sonorous rales over the whole chest, but one of the most valuable signs are *sharp, crackling dry rales, most marked on inspiration;* very frequently, especially in young children, these rales with feeble vesicular sounds and frequent respirations are the only signs obtained on physical examination. If the disease goes on to a fatal termination the face becomes cyanotic; breathing is frequent, labored, and shallow; numerous fine and coarse moist rales are heard all over the chest; the heart's action becomes more frequent and more feeble, and finally fails. Cases which terminate favorably do so in a very variable length of time, from five days to three or four weeks; the usual duration is about ten days; the signs of resolution are diminution in frequency and increase in the depth of breathing; the vesicular sounds become clearer, dulness diminishes, and the rales lessen in number.

## LOBAR PNEUMONIA.

Lobar pneumonia occurs at all ages; young children are often attacked, but in adults it is much more frequent. The name is somewhat misleading, as we frequently find only a part of a lobe affected, or one lobe and an adjacent portion of another, or a portion of a lobe in the opposite lung.

In the study of the physical signs the points to be kept in mind are that there is a massive consolidation caused by the filling of the air vesicles with the products of an acute exudative inflammation, that the pleura over and near the consolidation is often inflamed, that the bronchi contain mucus and inflammatory products which partially and sometimes wholly obstruct their lumen. It has been customary to divide the course of the disease into three stages: first, that of congestion—the blood-vessels dilate; red and white blood cells, serum, and fibrin begin to fill the air vesicles and terminal bronchi; second, that of consolidation, or red hepatization—the vesicles and terminal bronchi are filled with the products of acute exudative inflammation; third, that of resolution, or gray hepatization—the inflammatory

products are absorbed into the blood and are partly removed in the act of coughing, leaving the lung in its previous normal condition.

**The First Stage.**—At the beginning no signs may be obtained, but as a rule the breathing is diminished; it is occasionally harsh; there are a few subcrepitant rales heard in some cases. When the exudate begins there is some dulness, a little increase in the fremitus, diminished or a slight bronchial element in the breathing, a louder, slightly higher-pitched nasal voice, and subcrepitant rales mixed with crepitant rales; if pleurisy complicates this stage there may be friction sounds and crepitant rales quite early; the friction sounds and crepitant rales may be heard over an area much more extensive than the pneumonia; this stage lasts from a few hours to one or two days.

**The Second Stage.**—Diminished movement of the affected side may be very apparent; the respirations are hurried and often shallow and perhaps restricted by the pain of pleurisy. The fremitus over the affected lobe is increased; the resonance is dull or flat, occasionally cracked-pot. Breathing is bronchial or tubular. The voice is bronchial. *Crepitant rales* are often heard at the beginning of this stage and sometimes throughout; frequently no adventitious sounds are heard.

If the large bronchus which enters the lobe is plugged with the products of inflammation, voice and breathing may be lost and no adventitious sounds heard.

When there is a fluid or marked fibrinous exudate in the pleural cavity the signs may be those of pleurisy, but, as a rule, the constitutional symptoms in such a case enable one to make a correct diagnosis.

The duration of these signs are from a few days (the average being about six) to two or three weeks, the latter being most exceptional; it is fairly common to have one lobe attacked while another is in the course of the disease; in this way the duration of the disease is greatly lengthened, while the physical signs of the different stages become confused.

**The Third Stage.**—When resolution begins the first sign may be a return of the crepitant rale; this, the so-called "rale redux," is seldom quite as dry as the early crepitant rale and is usually larger; it may be absent and the rale may be of a more subcrepitant nature at this period; in any case the rales soon become large and moist, with some mucous and sonorous finally appear-

ing; the next change denoting beginning resolution is in the breathing; air enters better and the bronchial element becomes less intense, with a little vesicular quality appearing in the inspiration. Change in the percussion note is generally later than the above signs, and may be very slow to appear. As a general rule, in about five days breathing has become vesicular, resonance is only slightly dull, but subcrepitant rales may still be numerous. In from a week to ten days the lung has usually cleared up.

Delayed resolution, after the constitutional symptoms have ceased, is not uncommon; in such cases dulness, bronchial breathing and voice, with or without subcrepitant rales, may persist for a few weeks.

The ultimate condition of the lungs is usually a complete return to the normal state. When pleurisy has complicated the pneumonia a thickened pleura may be left behind.

Empyema often supervenes before complete resolution takes place. Abscess of the lung may occur in a resolving pneumonia.

A tuberculous infection may occur at this period or develop later on.

Complete resolution may never take place. Some of the exudate organizes or the interstitial tissue becomes the seat of a chronic inflammation, which results in a chronic interstitial pneumonia or a fibroid phthisis, with or without bronchitis.

**The diagnosis of pneumonia** is in most cases easily made. The onset in two-thirds of the cases is with a chill. Fever soon occurs and rises rapidly. An irritating cough without much expectoration is seen early. Pain on the affected side is very frequent; this is usually due to the accompanying pleurisy. The breath sounds become frequent and shallow. The ratio between pulse and respiration, which is usually 4 to 1, may become 3 to 1, or even less. The sputa is often very characteristic, it is most frequently rusty-colored or even streaked with blood; sometimes it looks like prune-juice. It is usually very sticky and hard to get up, and difficult to expectorate. The physical signs are often quite long in coming to the surface, but the general signs are apt to be convincing. Sometimes the cheek on the same side is flushed. Herpes labialis is sometimes seen. The signs sometimes begin with severe and marked head symptoms, which look like meningitis. The kidneys may be congested early, and the urine may contain a good deal of

albumin. Severe gastric symptoms may usher in pneumonia of the left lower lobe. The frequency of the respiration should always make one suspicious. Some patients bear pneumonia very well, and may be walking around without any marked symptoms. In old people the disease frequently comes on without cough or fever.

The course of the fever in pneumonia is, as a rule, sudden in its onset, reaching its height in a couple of days or less, and remaining nearly steady for from five to eight days, and then defervescing by crisis, taking, as a rule, no longer than twelve hours to reach the normal. Sometimes the course of the fever is quite irregular. It may fall to normal within the first forty-eight hours, and then rise again. In some cases toward the end there is a sudden fall, followed by a rise which continues for a day or two. The fever may disappear gradually, taking several days to reach the normal. Chills may occur in occasional cases during the course of the disease. Pain may be a very severe symptom, but it is often absent altogether. Cough is in rare cases absent.

The differential diagnosis is seldom difficult, but in some cases there is a complete resemblance in the signs to those of pleurisy with effusion.

The conditions under which these similarities occur are frequent and important.

When a large bronchus is plugged, which happens not uncommonly in the middle lobe, there are the signs of effusion, sacculated when of the middle lobe and upper lobe, and when of the lower it looks like an ordinary effusion. There is nothing different in the signs except the evident occupation of an area corresponding to a lobe of the lung; however, the constitutional symptoms may enable a correct diagnosis to be made. When pneumonia is complicated with an effusion of large fibrinous exudation the signs are those of effusion, but the constitutional symptoms and sputum usually make the diagnosis.

When pleurisy with effusion or empyema have signs which are similar to pneumonia, diagnosis may be more difficult. In effusion the fluid sometimes takes the outline of a lobe or a portion of a lobe. There may be bronchial breathing and voice, and rales which are usually subcrepitant, but sometimes good crepitant, heard all over the effusion. The most valuable sign of fluid in these cases is the intensity of the flatness and the

diminished or absent fremitus, but exceptionally fremitus is present or even exaggerated when the fluid is not in large quantity. Displacement of the heart always points toward fluid. Constitutional symptoms of pneumonia are most valuable in the differential diagnosis.

Tuberculous consolidations often resemble those of lobar pneumonia in the signs, but the course of the disease and general symptoms, as a rule, enable the diagnosis to be made.

The use of the exploring needle for diagnosis should not be employed unless necessary for treatment of the disease or until every effort has been used to make a correct diagnosis.

## CHRONIC INTERSTITIAL PNEUMONIA.

This condition is usually the result of a lobar or broncho-pneumonia which has not resolved completely; it may accompany a chronic adhesive pleurisy or result from the inhalation of irritating dust.

One lobe is most commonly affected, but often one lung; both lungs are occasionally affected.

There is lacking expansion on one side, sometimes retraction and displaced heart toward the affected side. The side opposite may show exaggerated movement.

The vocal fremitus is increased; there is dulness, and in some cases at the bases the note is flat; the breath sounds may be feeble, but, as a rule, are bronchial or tubular; the voice is exaggerated or bronchial; subcrepitant rales are heard, especially over the base. Sometimes dilatation of the bronchi takes place; in such cases cavernous or amphoric breathing with gurgling or rattling metallic rales are heard over the cavities.

The physical signs of interstitial pneumonia are practically the same as some chronic, fibroid, tuberculous conditions of the lungs; the only positive way to distinguish between them is the finding of tubercle bacilli or establishing a tuberculin reaction; the constitutional symptoms may, but generally do not, aid in the diagnosis.

## ABSCESS OF THE LUNG.

Abscess of the lung may follow pneumonia, pyæmia with septic infarctions, wounds of chest and lung, inhalation of foreign bodies, or infection from a bronchiectatic cavity.

There may be no positive signs. If it ruptures, expectoration of large quantities of pus is seen.

Sometimes there is some dulness, bronchial breathing and voice, with crepitant and subcrepitant rales. After a varying length of time breathing and voice may become cavernous or amphoric, with gurgling or metallic rales; in fact, all the signs of a cavity which may progressively increase or in some cases disappear, apparently, with a return to normal conditions. The bases of the lungs are more often affected than other parts.

The causes of **gangrene of the lung** are similar to abscess, as are the signs, but in this condition the intensely penetrating, offensive odor of the breath easily distinguishes it. The symptoms are usually graver, though recovery may take place.

## PULMONARY TUBERCULOSIS.

Tuberculosis of the lungs presents in its numerous forms almost every variety of physical signs found over the lungs; in trying to understand them it is necessary first to know what the mechanical conditions are which produce them, and, secondly, what is the usual order and course of these conditions.

We shall not enter into the physical signs of conditions already described, but merely mention the part they play.

**Pleurisy of a tuberculous nature** often exists, but may never extend to the lung; in progressive cases, however, it invariably does. The underlying lung tissue often is invaded, but more frequently we find the infection has developed at the apex of either side, more often perhaps on the side opposite to the pleurisy.

When the lung is primarily involved the adjacent pleura in progressive cases always becomes affected, while attacks of dry pleurisy or pleurisy with effusion on the same or opposite side are quite frequent in the course of pulmonary tuberculosis.

**Bronchitis** is usually found in the area of lung affected by tuberculosis; it often attacks other parts of the lung or a quiescent tuberculous area as a complication. It may produce the only physical signs of pulmonary tuberculosis.

**Consolidation of the lung** may take the form of a lobar or bronchopneumonia; it is generally supposed that the tubercle bacilli are not responsible for the production of such an exudative inflammation, but when this takes place another infection is the cause.

Consolidations may be acute and primary or may occur at any time in the course of a chronic case; when acute they may clear up, but, as a rule, they result in a chronic organized fibrous condition, or coagulation necrosis sets in, with areas of softening which finally become cavities.

**Pneumothorax** is an occasional complication of pulmonary tuberculosis, by far the most frequent cause of this condition being a ruptured caseous spot on the surface of the lung.

**Infiltration of the lung** is the most common and frequent change found in this disease; the term is used because in the walls of the bronchi and air vesicles miliary tubercles form. With the production of miliary tubercles there is congestion and swelling of the capillaries; this causes bronchitis in the adjacent bronchi, and an increase in the interstitial tissue; nodules in time are formed, made up of miliary tubercles and fibrous tissue; these often become caseous, they remain encapsulated or break down, and are coughed up through the bronchi.

The signs of infiltration are most important; in the earliest stages the only signs are subcrepitant rales; these are usually increased and intensified by coughing and often are heard during coughing only; as the infiltration increases a little dulness is obtained; breath sounds are usually diminished, but if the pleura is quite free they may be harsh with prolonged expiration, or the breathing may be bronchovesicular. The voice is exaggerated, as a rule, but sometimes diminished. Subcrepitant rales predominate, but a few crepitant, sibilant, or sonorous are sometimes heard. In advanced cases when the infiltration is around a bronchus, should there be tough mucus in a good-sized bronchus, we get rales which have a vibratory character and also are loud and resonant, having a sounding-board quality, and which are often mistaken for sounds made in the pleura. Very advanced cases show marked retraction and diminished expansion; the percussion note becomes very dull, sometimes flat or dull, tympanitic or cracked-pot. Cracked-pot resonance may reveal the signs of one or many cavities, but the cavities in these cases are seldom very large.

**Cavities** are formed in two ways. In the chronic miliary variety the walls of the bronchi are weakened, through inflammation of the muscular and elastic coats; the mucous coat has its ciliary function destroyed and the whole structure of the lung has lost its ability to contract; thus the secretions and products of

inflammation accumulate, and in time dilatations of the bronchi take place and form cavities. The walls of the cavities may ulcerate or cheesy nodules break down, and in this manner cavities of large size may result. The other way in which cavities are produced is by softening and necrosis in consolidations; coagulation necrosis occurs in spots, these soften and are coughed up through the bronchi; in such cases very large cavities form, but these cavities may become smaller owing to the contraction of the lung or through the heart being displaced and occupying some of the space made by the loss of lung tissue. The physical signs depend on the size of the cavity or cavities, their number, the condition of the surrounding lung tissue, and the thickness of the chest wall.

When there are one or more small cavities in an area of infiltration there may be slight retraction of the chest wall; dulness or cracked-pot resonance; increased fremitus; tubular, bronchial, cavernous, or amphoric breathing, with bronchial or cavernous voice and whisper; rales which are characteristic are gurgling or liquid, metallic, rattling rales, obtained best during coughing; such rales may be absent if the cavity is empty. When there are cavities in the centre of an area of consolidation, if they are small, the only points which distinguish them from pure consolidation are the cavernous or amphoric breathing, cavernous voice or whisper, gargling or liquid metallic rales; these signs may be absent at times, and the presence of a cavity would not be suspected.

Large cavities give very marked signs. There is usually marked retraction of the chest wall; fremitus is increased unless the pleura is much thickened; the resonance, as a rule, is flat. When the chest wall is thin and a bronchus communicates with the cavity, cracked-pot resonance is usually present; a high-pitched tympanitic note or high-pitched amphoric note is very characteristic; if the mouth of the patient is held wide open the percussion note may become lower in pitch and more tympanitic or amphoric. The breath sounds are very characteristic, usually cavernous; or when the cavity wall is firm and the communicating bronchus small there is very pure amphoric breathing; bronchial or tubular breathing is sometimes present, but is not characteristic. The voice is cavernous or bronchial; very often the individual words seem made in the cavity, being called pectoriloquy; the whisper is cavernous or amphoric; loud,

bubbling, gurgling, or liquid, metallic, rattling rales are heard, especially during coughing; sometimes in very large cavities a metallic tinkle is heard. Sometimes the presence of a cavity can only be determined by the act of coughing, when a cavernous or metallic hissing sound is produced by the air being driven forcibly into the cavity.

**The Course of the Signs in Pulmonary Tuberculosis.**—The disease runs an acute, subacute, or chronic course.

Acute Varieties.—This class is not frequent, though by no means rare.

(*a*) *Acute miliary tuberculosis* of the lungs does not occur as a local condition only, it is a part of the general disease; neither the symptoms or signs point particularly to the lungs. There may be signs of a general bronchitis, but often no pulmonary signs are present. This disease is fatal in a few weeks.

(*b*) *Acute pulmonary tuberculosis* with consolidation may take the form of lobar pneumonia or bronchopneumonia, the signs may clear up and recovery take place, but this is very rare; sometimes it terminates fatally in a short period, very seldom as short as pneumonia, but usually lasting a few weeks. The areas of consolidation break down rapidly; necrotic cavities give their signs; there is rapid wasting, high fever, very frequent and feeble heart action, distressing cough, and profuse sweating. As a general rule the acute symptoms become better, part of the consolidations clear up, and the disease becomes subacute or chronic.

Subacute Varieties.—This class is more common.

(*a*) *Subacute miliary form* comes on with the signs beginning almost invariably at the apices of one of the upper lobes, much less frequently in one of the apices of the lower lobes; but it does begin, though rarely, at the bases of any of the lobes, or at any point. At first there are the signs of local infiltration, which extend rather rapidly; there is often complicating pleurisy, either dry or with effusion; as a rule, both lungs are soon affected and the signs of infiltration with much bronchitis become general; cavities do not often form, but the bronchiectatic variety may occur. There may be complicating consolidations with characteristic signs; cavities may form in the consolidated areas; as a general rule, consolidations do not take place. There is always rapid heart action, afternoon and evening fever, emacia-

tion, and sweating. These cases last from six months to longer than a year; there may be periods of slight improvement, but the signs are usually continuously progressive. The acuteness occasionally ceases and the process becomes chronic.

(*b*) *Forms with consolidation* are less common; they follow the acute pneumonic variety or begin subacutely. The apices do not usually show the first signs; the most frequent site of the beginning is the base of the left upper lobe anteriorly, extending upward; it may begin in the lower lobes, or middle lobe, or the right upper. The first signs are those of consolidation; they differ somewhat from pneumonia, that is, if studied for a few days, we seldom find such good crepitant rales; rales may be absent, usually we hear moist subcrepitant rales in abundance. The signs of consolidation may remain in *statu quo* for weeks, but, as a rule, the areas increase at their periphery and break down in the centre. If the opposite lung becomes affected it is usually with the subacute miliary form; there may be complicating pleurisy on either side. In this form, in the late stage, large cavities are found; there is great retraction of chest wall and displacement of the heart, emaciation, profuse sweating, afternoon and evening fever; very often there are profuse hemorrhages; these are occasionally fatal and always increase the rapidity of the disease.

These cases also last from three months to longer than one year. They may become chronic.

Chronic Pulmonary Tuberculosis.—This is by far the most frequent as well as the most important variety. The term is only relative; the majority of the cases begin very insidiously, often giving no symptoms for a considerable time after signs have appeared in the lung; chronic cases as a rule are of longer than two years' duration, and at some time in their history present no constitutional symptoms, although physical signs are present; there is usually cough with some expectoration, but there may be no cough at all; fever is absent and there is no loss of weight. The detection of these cases early in their course depends almost entirely on the skill of the physical examiner; the examination of the sputa, though frequently of value, is often negative and therefore misleading; the use of tuberculin, we are told, is surely of value, but it is not generally employed, for there is a great though seemingly unwarranted prejudice against its use. It follows one of two courses:

(*a*) Chronic Miliary Tuberculosis of the Lungs.—In the great majority of cases the signs are first discovered at the apex of either upper lobe; the most valuable and early signs are fine subcrepitant rales almost invariably increased by coughing or heard only during or after coughing; according to Osler these rales in the majority of cases are first heard posteriorly in the inner part of the supraspinous fossa, about one and one-half inches from the tip of the apex; while the author has found this a frequent spot for the signs to begin, yet after an unusually large experience is convinced that at least two-thirds of the cases first show signs in front above the clavicle. The signs may begin in the first space near the sternum, or posteriorly, just below the apex of the lower lobe. After the appearance of the rales, changes in the breath sounds may take place; usually they are diminished from poor expansion, especially if there has been any pleurisy; sometimes the breath sounds are harsher; there may be prolonged expiration which may become tubular; dulness is a very valuable sign, but may not occur early; retraction takes place when the process is fairly advanced; diminished expansion is not noted very early, but occurs in time. Changes in the voice and whisper are not valuable as early signs. They become exaggerated after some time.

The other ways in which chronic miliary tuberculosis begins are numerous, but not of frequent occurrence. In people past middle age the signs may first be of dry pleurisy at the extreme apex, heard best over the clavicles; there is slight dulness or the resonance is good; breath sounds are usually faint; fine dry rales are heard, chiefly on inspiration, but very often on expiration, too; they are not increased or brought out by coughing unless expansion is made greater; such signs may last an indefinite time before the lung becomes involved.

In other cases signs begin as a dry pleurisy at one base, which persists for some time before the underlying lung becomes involved.

In a few cases signs begin as a localized bronchitis, either at the base or apex, usually at the base; there is no dulness; expansion is fairly good; breath sounds are usually diminished by the number of rales. These are abundant, moist, subcrepitant, with a few sibilant and sonorous; expectoration is not profuse like a simple bronchitis would be; at first there may be exacerbations, at which time the secretion is profuse; tubercle bacilli are not

numerous and only found after prolonged search. The extent of the signs over the lung gradually increases. The other lung becomes involved; pleurisy and consolidations may complicate the course; cavities finally occur.

Chronic miliary tuberculosis is often preceded by attacks of dry or wet pleurisy, which apparently subside; but weeks, months, or years later the signs of infiltration begin at the apices.

It has been shown how numerous are the ways in which the signs of chronic miliary tuberculosis of the lungs begin; the further course is equally variable.

Many cases recover; in these no signs may be obtained, or there may be slight dulness, diminished expansion, diminished or exaggerated breath sounds; a few dryish or clicking rales may be obtained on coughing, but, as a rule, they are absent; at the bases signs of thickened pleura are often discovered.

When the disease persists it usually has periods of quiescence and then of activity; there is progressive impairment of lung function; the disease spreads until both lungs are generally involved in various stages at the same time; the chest is retracted at the apices, there is much dulness, and signs of cavities at the apices if the disease commenced there, or at the base if it began there.

Great emaciation, fever, night sweating, and great frequency of heart action are found toward the end, and finally exhaustion takes place.

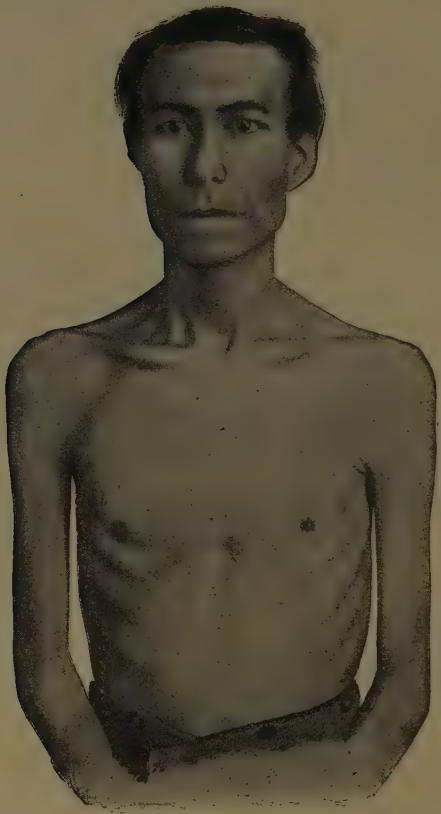
This course may be interrupted by attacks of pleurisy, consolidations, pneumothorax, and severe hemorrhages.

(*b*) Chronic Pulmonary Tuberculosis with Consolidation.—The most common variety is where one lobe or a portion of another next to it is involved; this follows the acute or subacute variety or is primary. It may remain stationary for weeks, months, or years; the latter variety, which becomes organized into fibrous tissue, is the so-called "fibroid phthisis;" such a state of one lobe or lung may remain stationary for a life-time, but, as a rule, after some years bronchiectatic cavities form and constitutional symptoms show themselves.

In the ordinary cases after a year or two signs of cavity formation begin; large cavities, great retraction of chest wall, and displacement of heart result; the other lung becomes affected, as a rule, by infiltration, sometimes with consolidation, until most of both lungs are affected with tuberculous disease.

The last stages may show signs almost similar to the chronic miliary form.

FIG. 3



The phthisical chest. Full-blooded Indian, Philadelphia Hospital. (Musser.)

The general appearances of tuberculosis are not as valuable as many writers teach; it must be striking to any observer to see how seldom we find the thin, long, flat chest with winged scapulæ, the finely textured skin, and hectic flush. Of course, it is easy

in many cases to look at the emaciation and pallor; the pale, bright, though vacant, eye; the hurried breathing, and to say

FIG. 4

The phthisical chest. Full-blooded Indian, Philadelphia Hospital. (Musser.)

quite correctly, in most cases, that "this is tuberculosis;" we do this, however, mainly on probabilities, because we do see patients

convalescent from long illnesses, or suffering from severe gastric or intestinal disorder, and some cases of malaria which have all the appearances of tuberculous subjects.

In the early chronic cases it is notorious how deceptive appearances can be.

The **diagnosis of pulmonary tuberculosis** depends largely on the knowledge of the physical examination of the chest, and if this is sufficient the vast majority of cases which come under observation are easy to recognize; but a certain number of cases will present themselves which, for a certain time anyway, cannot correctly be determined, and others which are baffling. Acute pulmonary tuberculosis with consolidation may appear with the signs and symptoms of lobar pneumonia or bronchopneumonia, and it may be only after days or a few weeks that the nature of the case is made out. The examination of the sputa is usually negative for one or two weeks, even then the bacilli may not be obtained; but the failure to resolve in the regular way, and the continuance of the fever with, perhaps, night sweats, cause a strong suspicion of the nature of the disease. Some of these cases improve very much, and for a time the physician may be thrown off his guard; but although some improvement may take place, cure is a rare sequence.

Subacute miliary tuberculosis with few or no signs in the beginning may start in and run a course something like the first stages of typhoid. The presence or absence of cough cannot be regarded as of much value in the diagnosis of these cases. Tubercle bacilli are not easily found. The fever is usually more irregular than typhoid; there is apt to be more sweating. The spleen is not enlarged. There are no spots. The patient is usually brighter. Pulmonary signs appear after a while. There is absence of Widal's reaction.

In the chronic forms a sudden hemorrhage, although followed by no pulmonary signs, if the history is clear that it came from the lungs, little doubt should be felt as to its tuberculous origin. Such cases may never give further signs, but often hemorrhages are repeated and the signs of tuberculosis become apparent in course of time.

Cases of tuberculosis which begin with the signs of a general or localized bronchitis are exceedingly hard to be positive about unless the bacilli are found in the sputa; but, unfortunately, the bacilli may not be found for a very long time. If the signs are

confined to one lobe or one lung and persist, the case is probably tuberculous, unless that side had been previously affected with pneumonia; even then such signs are more apt to be tuberculous. The tuberculin test would be of value in these cases. The presence or absence of fever in these cases is not always helpful in diagnosis, although in a general way it points to tuberculosis. When the signs of bronchitis are general and persistent, with as many rales at the apices as at the bases, there should be a very strong suspicion of its tuberculous origin.

Cases of mitral stenosis with congestion of the lungs and small hæmoptysis should give little difficulty in diagnosis unless the murmur were absent, but even then the accentuated pulmonary sound should be regarded as good evidence.

The pulmonary sound in tuberculosis of the lungs is usually accepted, by those who do not think, as being always accentuated, no greater error than this could be made, for it may be considered the rule that no matter how severe the form of tuberculosis may be, unless the anterior left lobe over the pulmonary artery is affected either with consolidation, dense infiltration, or thickened pleura, the pulmonary sound is not accentuated. It must be put down as a general rule that the early diagnosis of the chronic forms of tuberculosis is not difficult, because signs exist at some point in the lungs, particularly at the apices, long before constitutional symptoms are present.

Hæmoptysis, as a diagnostic symptom, is often very valuable. A large hemorrhage from the lungs, barring rupture of an aneurysm into a bronchus, always means a tuberculous lesion. Repeated small hæmoptyses, if there is no cardiac lesion, is also very good evidence.

Blood-streaked mucus may be coughed up when there are non-tuberculous ulcerative lesions in the larynx and trachea, or from virulent paroxysms of coughing, or from intense congestion of the lungs, as in bronchitis, pneumonia, and cardiac insufficiency. It is quite remarkable how frequent tuberculous hæmoptysis occurs without pulmonary physical signs.

The blood in tuberculosis is not characteristic; there are usually fewer red blood cells and less hæmoglobin. The leukocytes are more apt to be diminished with a relative increase in the lymphocytes.

Cytodiagnosis has received considerable attention. When an effusion is of high specific gravity, 1015 to 1025, with a large

number of lymphocytes and much fibrin, it is more apt to be a tuberculous exudate than a simple transudate. It has more value in abdominal effusions than in thoracic. Inoculation of animals with sputa and exudate is an uncertain method of diagnosis. Examination of sputa may be of the greatest value in some cases with few physical signs, but, as a general rule, positive physical signs may be obtained long before tubercle bacilli are present in the sputa.

# CHAPTER VI.

## DISEASES OF THE STOMACH.

### THE NORMAL STOMACH.

The cardiac orifice lies at a point on a level with the junction of the seventh left costal cartilage with the sternum; it lies in front and slightly to the left of the aortic opening in the diaphragm. The pyloric orifice varies slightly in its position; it is usually at a point under the liver, on a level with the costochondral junction of the eighth rib on the right side, but is often found on a line between this point and the umbilicus, and, unless out of place, does not approach nearer than two inches of the umbilicus; the upper curvature is concave and lies between the above points; the lower border is convex and its outline greatly depends on the amount of stomach contents. When the stomach is normally distended it passes to the left from the cardiac orifice, comes in contact with the under surface of the diaphragm, which it leaves at about the ninth rib, curving downward, passing about two inches above the umbilicus to the pylorus.

It is impossible to palpate the outline of the normal stomach correctly; percussion usually elicits a fairly characteristic, low-pitched, tympanitic note when there is much gas present, but the varying amounts of food and gas in the stomach make percussion under usual conditions quite unreliable in the estimation of the size of the stomach.

Several methods are employed to determine the size; the stomach must be made empty by fasting or lavage; it may then be filled with water through the stomach tube, and judgment of the size made by the amount of water received or by the position of the lower border, obtained by percussion over the water, which gives a dull note; this method is unreliable because the stomach may eject a large quantity of water or it may pass rapidly through the pylorus.

Distention with gas is more satisfactory; this is done by swallowing the two different parts of a Seidlitz powder separately, each being dissolved in a little water, or by injecting

air through a stomach tube and then by percussion, and sometimes in thin abdominal walls by inspection, the outline of the stomach can be determined fairly accurately; this must be done rapidly, because air may pass through the pylorus or be belched up. A good idea of the site of the lower border of the stomach may be obtained by the introduction of an electric light attached to a flexible tube and watching for the shadow, or a tube with a small piece of metal or mercury at the tip and watching its position with the *x*-rays.

In cases of very thin abdominal walls the contractions of the stomach walls may be seen.

## DILATATION OF THE STOMACH.

Slight degrees of this condition may be impossible to determine. The condition is almost always due to obstruction, as from a tumor of the pylorus, duodenum, head of the pancreas, adhesive bands, etc.; such causes may often be discovered; when the condition is primary and sometimes when secondary the dilatation of the stomach may be all that can be discovered; as a rule dilatations are never very extreme; the lower border may be found two inches below the umbilicus, and the pylorus two or three inches to its right; in some cases the lower border has been found almost at the pubes and the pylorus in the right inguinal region. Symptoms of distention, flatulence, acid regurgitation, and the vomiting of enormous quantities of food are usually present. The outline of the stomach can often be seen.

## GASTRITIS.

**Acute Gastritis.**—This disease shows few signs; there may be marked tenderness over the epigastric region; this may be general all over the abdominal muscles, if vomiting has been severe; there is seldom rigidity of the muscles.

**Chronic Gastritis.**—There are practically no signs to aid in the diagnosis; it is, however, quite common to find epigastric tenderness.

## ULCER OF THE STOMACH.

Some cases give tenderness at a certain spot in the epigastrium, adjacent to site of ulcer; as most all ulcers are near the pylorus and lesser curvature, this is not a frequent sign.

Dilatation of the stomach may be secondary to a cicatricial structure at the pylorus; these cases are rare.

Perforation of the stomach wall can seldom be determined without physical examination; if the condition is gradual and located on the anterior surface or lower border there is localized pain and tenderness, with the gradual formation of a tumor; an abscess may form and increase to a considerable size, giving semifluctuation; it sometimes breaks into the stomach or colon and discharges, a cure resulting; it may break into the peritoneal cavity and cause general peritonitis. If the perforation is posteriorly or at the lesser curvature, the diagnosis is exceedingly difficult; the formation of a retroperitoneal abscess is sometimes seen, but the abscess is usually subphrenic; the pain, the immobility of the diaphragm, determined by the absence of the shadow of the diaphragm, the so-called "Litten phenomenon," are of value in diagnosis; in some cases the diaphragm is perforated as well as the lung; the pus then may escape through a bronchus, and cure result; but most cases die from septic infection or secondary peritonitis.

When the perforation is sudden and of large enough size to allow of the escape of gastric contents, the picture is very different. If the rupture is in the posterior wall and gastric juice escapes, pain is agonizing; there is an awful burning sensation which radiates in all directions from the point of rupture; it is often felt in the back; vomiting is frequent.

Shock is marked with rapid, feeble heart action; there is marked epigastric tenderness, without there being any localized point. After several hours the acute suffering diminishes, shock passes off, tenderness persists, there is a rise of temperature, and signs of peritonitis set in.

In some cases when there has been very little escape of gastric juice the symptoms and signs are less marked, peritonitis may be localized, and the cases resemble the small, gradual perforation.

When the anterior wall is perforated, with escape of gastric contents, much depends on the stage of digestion; if the stomach is empty, pain is not as severe and the point can be more readily localized; there is always marked tenderness. Nausea and vomiting are usually present; signs of peritonitis set in after a few hours.

When there has been considerable escape of gastric contents, pain and shock are very marked, vomiting is usual, and tenderness

is very general over the epigastrium and hypogastrium. Signs of peritonitis rapidly supervene. In any of these cases, especially when the perforation is on the anterior surface, the escape of air into the peritoneal cavity may take place; a large amount is not of frequent occurrence, but if such does happen the signs are very characteristic. There is marked abdominal distention, with the obliteration of liver dulness; the percussion note is very tympanitic over the whole abdomen. If the stomach is fairly empty and the amount of fermentation inconsiderable, there may be very little gas in the stomach, and it would be impossible to determine whether moderate distention were due to escaped gas or intestinal tympanites.

In the general appearance of the patient there is nothing to make a positive diagnosis of ulcer; they may be anæmic, especially if hemorrhages have taken place.

The secondary anæmia cannot be told from the primary simple anæmia, which is so common in young women; the examination of the blood does not clear up the difficulty. Many cases of ulcer have never been suspected before a severe hemorrhage or perforation has taken place. The presence of an excessive amount of hydrochloric acid is often found in ulcer.

## CANCER OF THE STOMACH.

The disease, in the great majority of cases, is found at or very near the pylorus; the cardiac orifice is the next most frequent site, but almost any portion of stomach has been known to be affected. About 60 per cent. of the tumors can be felt at some time; but it is obvious that those around the cardia never can be palpated, and those on the posterior wall and to the left of the fundus could not be felt unless the tumor were very large and the patient much emaciated. If on the anterior wall or at the pylorus a very early diagnosis can be made on thin subjects, but where the abdominal walls are thick the difficulty increases. The nature of the tumor felt is fairly constant, it is firm to hard, it may be smooth or rather irregular and nodular, it is slightly movable, and descends a little during deep breathing.

When the pylorus is narrowed dilatation of the stomach may displace the tumor downward and to the left; the distinctness with which the tumor can be felt varies on account of the amount

of stomach contents, and the condition of the intestines and thickness of the abdominal wall.

The tumor may be confounded with a growth from the liver, a nodular cirrhotic left lobe, intestinal, omental, or pancreatic tumors.

Liver growths are distinguished by their position, greater displacement during breathing, and massive feel.

Omental tumors are distinguished by their unchangeability, more superficial feel, often greater diffuseness or multiplicity, and the absence of gastric symptoms.

Pancreatic tumors are deeper, more immovable; there may be sugar in the urine or excessive fat in the stools. Stomach symptoms are not so often present.

Intestinal tumors, especially of the transverse colon, are not frequent; partial fecal obstruction may take place and a good-sized tumor, soft, elastic, and tender, may form and disappear, leaving the original tumor; in time complete intestinal obstruction may occur, blood may appear in the stools; gastric symptoms are not usually present.

The possibility of splenic or renal tumors being mistaken for gastric cancer may be admitted.

In gastric cancer cachexia is usually early; the vomiting of large quantities of "coffee-ground" material, owing to small hemorrhages, is frequent; the amount may be enormous if dilatation is present; bright blood may be raised; tarry stools occur if the hemorrhage has been marked.

Hydrochloric acid is generally absent; its presence in *normal quantity* rules out cancer.

Secondary growths in the liver are not uncommon.

## HÆMATEMESIS.

Blood from the throat or lungs may be swallowed and afterward vomited, but this is usually determined by the history of first hawking or coughing it up.

When the blood comes from the lungs it is coughed up, at first being bright and frothy and afterward dark and mixed with sputa.

When it comes from the stomach it is usually dark unless the hemorrhage is profuse, when it has the appearance of any fresh

blood. Slow hemorrhage in the stomach may be vomited as "coffee-ground" substance.

The causes of large hæmatemesis is almost invariably gastric ulcer, though rupture of a vein, secondary to cirrhosis of the liver, has been known to be rapidly fatal.

Small hemorrhages may be due to cancer, anæmia, ulcer, leukæmia, scurvy, and cirrhosis of liver.

## GASTRIC PAIN.

A positive diagnosis of gastric troubles from the mere nature of pain is seldom possible.

In *indigestion* after taking certain food, pain, either dull or sharp and distressing, may be felt in the epigastrium, up through the chest or toward the back, almost immediately or within three or four hours; in some instances such pain is agonizing, but is not accompanied by local tenderness or shock.

In *ulcer* the pain may be like that of indigestion; it may, however, be almost characteristic, being fairly constant in its site, of a burning character, occurring very shortly after taking food, and continuing during active digestion. Pain due to perforation has already been described.

In *malignant growths* pain is variable; frequently it is a marked feature during active digestion; its quality is dull, boring, burning, or gnawing, either localized or radiating; pain may never be present.

In *neurotic affections* the pain has no relation to the taking of food; it is described as severe, but the patients do not seem to suffer, and the pain is not well defined; it does not react to medication, but is more influenced by suggestion.

# CHAPTER VII.

## DISEASES OF THE DUODENUM.

### THE NORMAL DUODENUM.

This is the beginning of the small intestine; it is about ten inches in length, winding around the head of the pancreas, being in front of the right kidney and second lumbar vertebra, and behind the liver, colon, and mesocolon.

It cannot be mapped out by any method of physical examination.

### ACUTE DUODENITIS.

The pyloric end of the stomach is usually involved; pain and tenderness are usually found a little above and to the right of the umbilicus; the pain may radiate and is seldom very severe; vomiting may occur, but is not as frequent as in acute gastritis. The most distinguishing sign is jaundice, which appears after one or two days, due to obstruction at the orifice of the bile-duct, or from catarrhal inflammation of the ducts; pain and tenderness soon disappear. The liver is usually a little enlarged and the gall-bladder distended, but not felt. There may be a good deal of tympanites. The stools are clay-colored and urine contains bile; pigmentation lasts from one to three weeks or longer.

### DUODENAL ULCER.

Compared with gastric ulcer it occurs very infrequently; figures vary from 1 to 10 to 1 to 40 cases of gastric ulcer; only about 10 per cent. of the cases can be diagnosticated; they usually give no definite signs or have signs of gastric ulcer; the chief points would be tenderness a little above and to the right of the umbilicus, sharp pain in the region about three hours after eating, and bloody stools without hæmatemesis.

Sometimes a tender tumor, due to inflammation and adhesion about the head of the pancreas, with jaundice, has been felt

above and to the right of the umbilicus. Perforation may take place with signs very similar to gastric ulcer; at first they may be less severe, but fatal symptoms develop after a time with great rapidity.

## CANCER OF THE DUODENUM.

Cancer of the duodenum is very infrequent; the second portion is most often affected; the disease may begin in the head of the pancreas and spread to the duodenum; owing to the deep situation a growth is hard to make out unless the abdominal walls are thin and relaxed, a tumor which is hard and often irregular may then be felt above and to the right of the umbilicus; there may be obstructive jaundice from involvement of the orifice of the common bile-duct; tarry stools without evidence of stomach hemorrhage are sometimes seen; emaciation and cachexia occur. It is practically impossible to differentiate between cancer of the duodenum and cancer of the head of the pancreas; cancer of the common bile-duct may also be confusing.

# CHAPTER VIII.

## DISEASES OF THE SMALL INTESTINE.

The umbilical and hypogastric region are normally occupied by the small intestine; palpation shows an elastic, somewhat resistant sensation; the percussion note is tympanitic, rather high pitched, unless there is much distention, when the pitch is lower; at times when there is very little gas in the intestines the pitch is high and quality dull.

### INFLAMMATION.

In **acute inflammations** the physical examination shows very little; often there is moderate tenderness and considerable distention.

**Chronic inflammations** are rare and show very little on examination, as a rule.

**Tuberculous inflammation,** which accompanies inflammation of the mesenteric glands, the so-called "tabes mesenterica" in children, presents, as a rule, very typical signs: there is general abdominal distention, with some tenderness; there may be a doughy feel; the general emaciation, pallor, and frequent fluid, offensive stools aid in the diagnosis.

### TUMORS.

Cancer of the small intestine may occur, but is very rare. The tumor is sometimes felt in the umbilical or hypogastric region; the emaciation, cachexia, and obstructive symptoms help in the diagnosis.

### OBSTRUCTIONS.

These are very important; as a rule they are acute and complete and are caused by stones, bands, internal hernias, volvulus, intussusception or invagination, or by tumors. Some symptoms are common to all forms.

Pain is usually sudden and severe, at first localized and then radiating all over the abdomen; it may be cramp-like. At first tenderness is not extreme, but later, if the peritoneum becomes inflamed, it may be exquisite.

Shock is very variable; it may be severe, with sudden collapse; as a rule it shows itself by an anxious look, pallor, expression of pain, and accelerated pulse. Nausea and vomiting are almost invariably present; at first the vomitus is food and bile, but later may become stercoraceous if the obstruction is not high up.

Abdominal distention, as a rule, sets in after a few hours; if the obstruction is high up it may not be very great; if low down it is much more marked; in all cases of obstruction in the small intestine the central portion of the abdomen is chiefly distended.

The inability to move the bowels or pass gas becomes absolute, but at first the rectum may empty itself and gases may pass because of what may have been in the terminal end of the bowel.

Differentiation depends largely on physical examination, though history is important.

Obstruction from bands, volvulus, or internal hernia is very difficult to differentiate. Tenderness at the site of the trouble is usual in the beginning; it becomes more general in a day or two. A distinct tumor is seldom felt, though there may be marked resistance and indefinite tumefaction; fecal matter and gas may pass at the onset. Vomiting begins early. A history of peritonitis, appendicitis, or surgical operations is to be looked for.

Intussusception is rare except in children; it may be found in any portion of the small intestine, more often at its lower end or at the ileocæcal valve. It may form somewhat gradually, from a few hours to forty-eight or even longer; pain is usually present, but is not always severe; there is tenderness and a well-defined, somewhat sausage-shaped swelling, usually in the hypogastric and inguinal region. There is usually tenesmus and much desire to move the bowels, with the passage of a little blood and mucus at almost every effort; vomiting is usually present; gangrene of the bowel, peritonitis, and septic infection soon take place unless relief is given.

Tumors are usually accompanied by some history of emaciation or cachexia; the obstruction is at first incomplete, though when complete the symptoms are not quite as urgent as in the preceding cases.

The tumor may be felt; this is not usual, but a fecal mass from recurring obstruction, which relieves itself after a day or two, is sometimes felt; at these times there is considerable tenderness and pain.

When complete obstruction takes place, the point of obstruction may rarely be made out by the accumulated bowel contents; no gas is passed by rectum; distention occurs, and finally vomiting; the patient usually dies from toxæmia.

## ENTEROLITHS.

These are very rare. There is usually the history of gallstones, or an enlarged gall-bladder which has attached itself to the intestine, and ulceration having occurred, the stone gets into the gut and becomes embedded in its course; it enlarges through the deposit of lime-salts and finally may obstruct the intestinal lumen; the signs are much like those of intestinal tumors.

# CHAPTER IX.

## DISEASES OF THE LARGE INTESTINE.

THE **normal large intestine** is difficult to map out; sometimes the percussion note over it is lower pitched tympany than over the small intestine.

**Displacement of the transverse colon** is often found when there is general enteroptosis; in these cases the abdominal walls are thin, relaxed, and pendent. The position of the colon can be determined by injecting air or fluid into the large intestine through the rectum; by inspection or percussion a fairly accurate idea of its situation may be obtained.

Clinically the **cæcum** is a very important part of the large intestine; it usually lies in the right iliac fossa or more internally toward the brim of the pelvis; it is in front of the psoas or iliacus muscles.

The **vermiform appendix** is connected with the posterior and lower portion of the cæcum; its length is about six inches and its diameter about that of a goose-quill; its direction is downward and inward; of course its position varies with that of the caput coli; its direction is not always the same; it may be twisted to the right or left or it turns up backward or is directed anteriorly. It may be found in the pelvis.

### TYPHLITIS.

This was a term formerly employed to mean inflammation of the cæcum; it is now seldom used because it is exceedingly doubtful if the condition ever exists apart from appendicitis.

### APPENDICITIS.

**Simple catarrhal appendicitis** in the beginning may only give pain which is sharp, somewhat cramp-like, but seldom disappearing completely; it is often felt near the umbilicus, and is occasionally referred to the left side; as a rule, it begins at the site of the appendix, in the right inguinal region; tenderness occurs

early at a certain point which is usually within a circle, the diameter of an inch, situated midway between the umbilicus and the spine of the ilium; the pain on pressure may be exquisite; muscular resistance commences early, and in many cases pain, tenderness, and muscular resistance are the only symptoms and signs; vomiting usually begins early, and in most cases there is a slight febrile movement. In some cases a distinct tumor can be felt over the tender area on the second or third day after the onset of symptoms, its direction is usually obliquely downward and inward, shaped like the thumb; this swelling is either the swollen appendix or the appendix and localized peritonitis. The duration of these mild cases is from five to ten days, when recovery takes place; recurrences are more than probable.

**Perforative Appendicitis.**—Perforation may be sudden, preceded by no symptoms, or it occurs within a few days; the result is acute general peritonitis, localized peritonitis, or abscess formation.

Acute general peritonitis may take place within a few hours after a sudden gangrenous perforation, or may occur from later perforations or be secondary to a local abscess. Such cases as the first are not frequent, though by no means rare. The signs may be those of peritonitis from the commencement and the diagnosis very difficult, being made by exclusion only; the degree of virulence is variable; some cases are cured by early operation, a few without operation, but the great majority are fatal under any method of treatment. General peritonitis which starts after a perforation which has occurred a few days after the onset of symptoms is less common than the first variety; the early local symptoms are definite; there is local pain and tenderness with or without a slight tumor, and then the symptoms of general peritonitis which behaves like the first set of cases.

General peritonitis secondary to a local abscess should be uncommon; but it does occur in neglected cases and sometimes owing to rupture of an abscess which is situated deeply in subjects with thick abdominal walls, where it has been difficult to determine the nature of the case. In these cases, besides the general peritonitis, there is the collection of pus which adds to the gravity.

Local peritonitis is a frequent result of perforation. There is an acute exudative inflammation; adhesions take place and there is a swelling which can be felt. Acute symptoms last from

five to ten days and clear up; a slight thickening may be felt about the appendix for some time. Recurrences are not as frequent as in the simple catarrhal cases.

Abscess formation is by far the most frequent result of perforation; for a few days and perhaps not for ten days it may be impossible to decide if this has taken place. As a rule, this can be determined in five days.

The onset of the symptoms and signs may be similar to the catarrhal cases; the severity is often greater, temperature is higher, and constitutional symptoms are more marked; the signs do not subside, the tumor increases in size, the severity of the early symptoms may pass off, but fever and local pain continue. The size of the swelling may become very large and yet in some cases the patients may be walking around; they usually walk with a slight limp favoring the right side. If left alone multiple abscesses may form or the abscess ruptures externally or into the peritoneal cavity or into the bowel, very rarely into the bladder or vagina.

The condition of the stomach in appendicitis is very variable; if vomiting occurs it is usually with the onset of the symptoms. The bowels are usually constipated, but it is not unusual to have a slight looseness of the bowels at the onset or the bowels may be loose most of the time.

The heart's action is increased by the fever or by septic absorption; if the pulse is very frequent it is a sign of the gravity of the case.

The **diagnosis of appendicitis,** as a rule, is not difficult and is in many cases exceedingly easy. On the other hand, some cases are very hard or even impossible to be sure of.

In acute cases, when there is perforation with general peritonitis rapidly ensuing, unless the case is seen early a probable diagnosis can only be made by excluding the other causes of an acute peritonitis; the pelvic history and organs must be examined and stomach and gall-bladder perforations looked for. When the case is seen early, if the pain and tenderness are referred to the regular situation of the appendix, the diagnosis is fairly easy, the only other possible causes being the rupture of a pus tube or sac in the pelvis, the pain being referred to the region of the appendix; in cases where this might be probable a pelvic examination would clear the situation. In cases where the appendix is not in normal situation, as below the brim of the pelvis or in

the left inguinal region or upward above the level of the crest of the ilium, the diagnosis is exceedingly difficult, especially in females, and such cases are more common in that sex. When the early signs begin in the pelvis in females a vaginal examination must always be made; a ruptured pelvic abscess, pus tube, or extrauterine gestation sac must be excluded; in both cases a tumor is usually felt in the posterior or lateral fornices; the history is very important, and the presence of shock and signs of hemorrhage are often present in extrauterine pregnancy. Another pelvic condition which may give rise to very severe local pain followed by signs of peritonitis is the twisting of the pedicle of an ovarian cyst or a pedunculated fibroid; in these cases the pain is very severe and agonizing; it is not very localized, but may be very marked in one inguinal or the pelvic region; the tumor can usually be felt, but great muscular resistance or thick abdominal walls might make this impossible, while the absence of any special history would be still more confusing; a vaginal examination, if possible, is of great assistance, but because of severe pain or in cases of unmarried women the results may be negative.

When the symptoms begin in the right side between the spine of the ilium and ribs, conditions arising from the gall-bladder have to be excluded; perforation of a stone with local or general peritonitis must be thought of; it might be possible to feel the gall-bladder, but with much tenderness and thick abdominal walls this is often impossible.

Empyema of gall-bladder gives local pain, resistance, and, perhaps, a tumor; stones in the gall-bladder may set up pain and tenderness and cause fever; in all these cases the seat of the trouble is usually too high to be due to appendicitis, but exceptionally they seem lower, and when the abdomen is not roomy the organs are close together and it is hard to discriminate between the causes of signs.

The catarrhal cases or late perforative cases with ill-defined local symptoms, with fever, vomiting, constipation, or diarrhœa, are exceedingly difficult to tell from gastroenteritis, for in the latter affection all the general symptoms may be present, with some tenderness in the region of the appendix; in these cases experience alone is helpful, and yet it might also be deceptive. An early diagnosis is impossible, even a marked leucocytosis is often unreliable, but in the course of a week or ten days the condition is usually clear.

Ovarian neuralgia on the right side is sometimes mistaken for appendicitis; the lower situation of the pain, absence of fever, and the tenderness obtained by a vaginal examination are, as a rule, sufficient to make a correct diagnosis.

When a large abscess has formed at the time the case first comes under observation, hardly anything else can be taken for the cause. In women pelvic abscesses may extend upward on the right side; the history and vaginal examination should clear these cases up. An ovarian cyst with twisted pedicle might give a history simulating appendicitis, and thus appear with a tumor on the right side which would resemble a collection of pus from appendicitis; in such a case a positive diagnosis would be impossible.

Blood examinations are sometimes very helpful in diagnosis, but the presence or absence of leucocytosis may be misleading.

## COLITIS.

**Acute Colitis.**—The physical signs are not important; distention of the colon is sometimes marked, but, as a rule, is not; tenderness over the colon may be present.

The stools are frequent, loose, and fecal if the upper part of the colon only is involved; if the rectum is the chief site there is almost constant straining with tenesmus, and the passages are small and mucous, with specks of blood mixed in.

**Chronic Colitis.**—There are no physical signs of value save of emaciation.

## TUMORS OF THE LARGE INTESTINE.

Malignant tumors are not uncommon; the rectum near the anus is by far the most common situation of the growth, but other parts of the large intestine may be affected.

The tumor can usually be made out by palpation unless situated in the lower part of the sigmoid flexure or the middle and upper portion of the rectum; those in the colon must be felt through the abdominal wall; a small growth would be impossible to feel; when it is the size of a small egg or larger it can be felt; at first it seems firm and smooth and usually rounded; as it increases in size it may become irregular, sometimes distinctly nodular; if the growth offers no obstruction to fecal matter the only other points in the diagnosis would be the

emaciation and cachexia, which are less marked than in cancer of the stomach, and the passage of blood in the stools; the latter is not always discovered and may never be present, but very often after spells of constipation a little blood is passed, and in some cases the passage of blood is quite a feature.

Secondary growths of the liver are not uncommon in cancer of the rectum. When the cancer is situated near the anus it can be felt above the internal sphincter with the finger; the surface is firm, irregular, sometimes like a mushroom; there are usually one or two places which project more into the bowel; often the mass nearly or completely obstructs the bowel; the surface may be ulcerated and bleed from the pressure of the finger.

There are not many conditions to be confounded with cancer of the rectum; other tumors are rare; polypi may occur; these are smooth, pedunculated, and not as hard as cancer, and there are no symptoms of obstruction. Old chronic syphilitic ulceration may at first be confusing, but the growth is never as hard; there is no marked cachexia, and treatment benefits.

In cancer of the colon or rectum there may be partial or complete obstruction.

## OBSTRUCTION.

**Partial Obstruction of the Large Intestine.**—Cancer is the most frequent cause; other causes are syphilitic and chronic ulceration with subsequent stricture, external pressure from pelvic tumors.

The chief symptoms are due to constipation which alternates with diarrhœa. When the bowels are neither loose nor constipated, if the obstruction is in the lower part of the sigmoid flexure or in the rectum, the stools are ribbon-like or worm-like; if the obstruction is high up in the colon, there is no characteristic formation of the stools. When constipation is obstinate there may be considerable pain, more or less colicky above the obstruction; if the obstruction is situated in the sigmoid flexure or colon, a fecal mass of considerable size may be felt above the tumor; this mass is somewhat tender, elastic, or doughy; the bowel above may be distended with gas, the colon being chiefly affected; after a few days the fecal matter passes and conditions seem fairly normal until there is another stoppage.

**Complete obstruction** in the large intestine is seldom sudden without any previous symptoms of partial obstruction; the

symptoms are never very acute; the history tells of obstinate constipation and the passage of no gas; the accumulation of fecal matter may be discovered by palpation if the obstruction is in the sigmoid flexure or colon, unless there is great abdominal distention from gas; the colon above the obstruction may be enormously distended; there is usually distress, colicky pains, and tenderness near the obstruction; after a few days vomiting may occur; if the obstruction is not relieved the vomitus may contain fecal matter, but this is not often seen.

In all cases of obstruction of the upper part of the rectum or lower part of the sigmoid flexure much aid in diagnosis can be obtained by examination of the pelvic organs and the use of the rectal tube or bougie to determine if any obstruction to its passage exists; before doing this it is well to irrigate the bowel.

# CHAPTER X.

## DISEASES OF THE PERITONEUM.

### PERITONITIS.

Physical examination plays the most important part in the diagnosis of these affections.

**Acute Peritonitis.**—This is probably never a primary trouble; one must always look for the original point of infection, which may be from the uterus, pelvic inflammations, appendicitis, perforations of stomach, intestines, or gall-bladder; these conditions give local symptoms and signs which have already been described.

When the inflammation becomes general over the peritoneum the signs are usually characteristic. Inspection shows uniform abdominal distention; the thighs are usually flexed on the pelvis; the abdomen is held as still as possible, the breathing being almost entirely thoracic; the expression of the face is uneasy, often anxious and pinched.

Palpation elicits exquisite tenderness all over the abdomen; in exceptional cases tenderness is not a feature; the abdomen feels tense, not giving the sensation of muscular contraction or fluid distention, but there is a peculiarly indescribable stiffness which is almost characteristic; pressure may cause nausea.

Percussion gives a tympanitic note all over; the note is louder and lower in pitch over the stomach and colon. The pulse is increased in frequency and usually a little increased in tension; it becomes more frequent and softer as the disease progresses. Temperature is very variable; as a rule there is fever between 102° and 104°, but may be very slight and occasionally absent; its curve is irregular and not characteristic.

Vomiting is almost always a marked feature.

Constipation is the rule; it is usually very obstinate.

The diagnosis of a well-established case of acute peritonitis is a simple matter, but in the early stages and in atypical cases it may be most difficult. After delivery when labor has been prolonged the heart may be very rapid, fever is often present,

and the abdomen is tender and may be distended with gas; such cases simulate peritonitis; the absence of vomiting or of exquisite tenderness are the chief points against peritonitis.

Cases of acute gastritis with obstinate constipation and great intestinal distention and general tenderness, due to muscular soreness and intestinal distention, with vomiting, fever, and fre-

FIG. 5

Tuberculous peritonitis; pulmonary tuberculosis. + site of cardiac impulse. (Musser.)

quent pulse, are exactly like some cases of peritonitis. One must be guided by the history of the cause and onset.

Cases of gastroenteritis with fever, abdominal soreness, and distention resemble early peritonitis; as a rule the tenderness is less marked and the distention is not as much; the history of the cause and onset are of great value in the diagnosis.

**Chronic peritonitis with adhesions** is an uncommon affection; it may follow acute peritonitis or localized peritonitis, and occasionally laparotomy.

The peritoneum is thickened and adhesions bind the intestines together. The signs show a rather resistant abdomen, with tenderness of slight degree in places.

The symptoms are of chronic gastrointestinal indigestion, with much colicky pain and obstinate constipation. Intestinal obstruction from bands or internal hernia may occur. The symptoms last for years and are seldom fatal.

**Tuberculous Peritonitis.**—This disease is almost always chronic in its course; it is more frequent in young children. It is usually primary, although it may sometimes be secondary.

Acute Tuberculous Peritonitis.—As a part of a general tuberculous infection in acute miliary tuberculosis, it is not infrequently seen; it seldom gives any special signs; there may be some abdominal tenderness, and a little fluid is sometimes found in the peritoneal cavity. Primary cases are very rare; the symptoms and signs may be like those of acute peritonitis, the course being rapid and fatal, but more often the symptoms subside and the case becomes chronic.

Chronic Tuberculous Peritonitis.—The signs in the beginning are not positive; there is usually some abdominal distention and slight tenderness.

When the disease is fairly well established the abdomen is distended; in many cases this is due to gas in the intestines, but generally comes from fluid in the peritoneal cavity.

Palpation elicits more or less tenderness all over; there is sometimes a doughy feel to the abdomen; free fluid is often easily made out, but sometimes the fluid is encapsulated and resembles a cystic tumor. Masses of small and large size are frequently discovered scattered over the abdomen, but being more marked in the region of the great omentum; these masses may be masked by fluid, although fluid does not always prevent their being felt; their shape is irregular, sometimes nodular and hard; their degree of tenderness varies, but, as a rule, they are not very sensitive. Masses may occur without fluid, but fluid by itself is much more common.

Hectic fever, emaciation, loss of appetite, occasional vomiting, constipation or diarrhœa, with abdominal pain, either dull or colicky, are the usual symptoms.

The diagnosis seldom presents many difficulties; when there are ascitic fluid and masses, malignant disease has to be considered; the age, cachexia, absence of much fever generally enable one to make the diagnosis of the latter trouble.

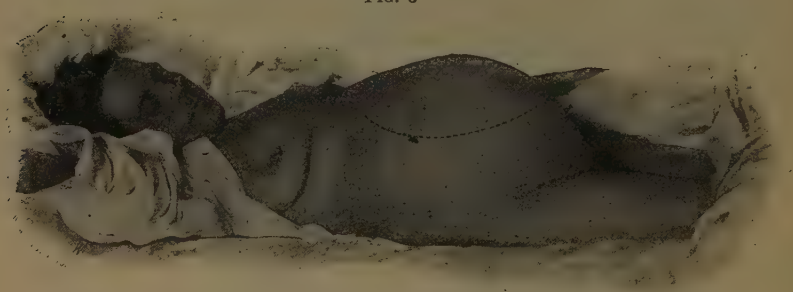
Encysted fluid in tuberculous peritonitis may be mistaken for hydatid cysts, abscess from appendicitis, pancreatic cyst, ovarian cysts, pregnancy, or distended gall-bladder. The manner of onset, history, course of temperature may be of more value than the physical signs.

## ASCITES.

The presence of fluid free in the peritoneal cavity is generally easy to recognize.

Small amount of fluid may be impossible to make out; the only sign may be a slight jelly-like wave obtained by sharp digs in the loins.

FIG. 6



Ascites. Upper limits of dulness indicated by the dotted line. Umbilicus prominent. (Musser.)

A medium amount shows abdominal distention; a fluid wave in some cases is obtained by tapping sharply in the loins, the patient being in the recumbent position, and one hand being held on the side opposite to the place tapped; the flanks are dull on percussion if the patient is on the back; the dulness becomes tympany if the patient lies on the side. In the upright position there is dulness in the hypogastrium.

A large amount of fluid always gives a fluid wave; it may be dull almost all over the abdomen, although if the patient is on

the back there is a small area in the epigastrium and umbilical regions which is more resonant than elsewhere; this resonance shifts with the position. The heart, liver, and spleen are pushed upward and the pelvic organs downward; the abdomen is uniformly distended, with flattening of the flanks if the patient is lying down. The most common condition to be confounded with ascites is a large ovarian cyst; in the latter case the abdomen

FIG. 7

Ascites from sarcoma of ovary. Dislocation of liver and spleen. + is apex beat, not lifted because of fallen abdominal organs. (Musser.)

does not flatten as much on lying down, and dulness is more marked in the umbilical region; the flanks are often tympanitic; the resonance does not change with position. The uterus is displaced to one side and downward to a great degree.

The contour of the abdomen is often deceptive, owing to the size and position of the liver and spleen and the amount and disposition of the gas in the stomach and intestines. This is shown in the illustrations.

## MALIGNANT NEW-GROWTHS OF THE PERITONEUM.

This affection is generally primary, originating in the omentum; the growths are frequently multiple. Carcinoma is more frequently met with than sarcoma.

The diagnosis is made by the physical signs in most cases. The tumor or tumors are superficial, and easily felt; they are very hard, are not freely movable, and sometimes quite fixed; deep breathing does not change the position of the tumors except very slightly; fluid is frequently found in the peritoneal cavity; it is usually free, but may be encysted; the fluid is usually bloody.

**Cancer of the stomach,** if situated on its anterior wall low down, may be mistaken for cancer of the peritoneum; the latter is distinguished by absence of marked gastric disturbance, its more frequent multiplicity and lower situation in some cases, and the frequency of bloody, ascitic fluid.

**Cancer of the colon** may resemble this condition, but intestinal symptoms, such as constipation, fecal impaction, blood in stools, with the absence of the characteristics of peritoneal tumors, in most cases leave little doubt in the diagnosis.

**Tuberculous peritonitis accompanied by the growth of masses** occurring in adults is very difficult to distinguish from malignant trouble; the physical signs in the abdomen may be the same; the diagnosis is made by the age, the appearance, and the greater frequency of hectic fever in tuberculosis.

## ENTEROPTOSIS.

This name is given to a condition in which many of the abdominal organs have become lower in situation owing to relaxation of their supports.

It occurs most frequently in women with thin abdominal walls, who have had several children; tight lacing is another cause. It may occur in men with relaxed abdominal muscles and thin walls.

The organs chiefly affected are the kidneys, especially the right; the liver, colon, and spleen.

Ptosis of the kidney is a very common condition in women; under this heading must be classed almost all cases of movable or floating kidney. The position in which the kidney is usually found in such cases is only a little lower than normal, but it

may be found in almost any part of the abdomen. The right kidney is most frequently affected.

Its recognition depends on its position, size, and shape; the normal kidney can hardly be mistaken for anything else excepting a distended gall-bladder; the differentiation of this condition will be described under tumors of the gall-bladder.

Ptosis of the liver is not common; it is found almost exclusively in women; it may be due to tight lacing; in extreme examples of this the liver has been divided so that a tongue, or portion, is felt several inches below the free border; if its connection with the rest of the liver is by a fibrous band it may be quite movable; its shape, edge, and consistence enable one to make the diagnosis rather easily.

Ptosis of the spleen is less common than of the liver, but its edge may be felt below the free border simply from relaxation of its attachments; sometimes it may be felt on the opposite side of the abdomen, even in the pelvis, being the so-called "wandering spleen;" these cases are probably congenital and are not simple cases of ptosis.

Ptosis of the colon, especially of the transverse, is not infrequent in women; the condition can be determined by filling the colon with gas or water; the abdominal walls are always much relaxed and distended.

# CHAPTER XI.

## DISEASES OF THE LIVER.

### THE NORMAL LIVER.

THE **signs of the liver in health** are obtained by inspection, palpation, and percussion.

**Inspection** is of value in subjects with thin chest walls; the descent of the diaphragm can be seen if the subject is placed in the recumbent position and an oblique light allowed to fall on the chest; this descent is best obtained by forced breathing, when a shadowy line falls and rises in the subaxillary region; this line denotes the point where the diaphragm leaves the wall of the thorax, owing to being pushed down by the lung, and therefore shows the upper limit of the liver; this line has its maximum descent in the midaxillary line, beginning at about the upper border of the eighth rib, passing downward from one inch and one-half to two and one-half inches; in some cases it almost reaches to the free border of the ribs. The shadow of the diaphragm is often called "Litten's phenomenon" because of its discoverer. In very emaciated or thin subjects the shadow of the lower border of the liver can be seen during full inspiration just below the free border of the ribs.

**Palpation** may not discover the normal liver in stout subjects, nor does it always do so in thin people; but very often the thin, sharp edge of the liver can be felt below the ribs outside the border of the rectus muscle; in children the lower border of the liver is normally lower than in adults, and is usually palpable; in women, on account of lacing, the liver is apt to be lower than in men. Although the liver passes across the epigastrium to the eighth rib on the left side, it is most difficult to feel the sharp edge in the epigastrium because of the firm recti muscles; the liver resistance may be felt, but not the sharp edge.

**Percussion** demonstrates two areas which indicate the liver; relative dulness begins about the upper border of the sixth rib on the right side from its costocartilaginous junction to the mid-

axillary line, when it descends obliquely to correspond with a line drawn to a point on the tenth rib vertical to the angle of the scapula; this relative dulness continues downward to the lower border of the seventh rib as far as the midaxillary line, and from here to a line passing from this point to the free border of the ribs at the posterior axillary line; below this line of relative dulness there is flatness to the free border of the ribs. The position of the liver is altered by the condition of the stomach and intestines, being pushed upward when there is much abdominal distention, and in such cases the area of liver dulness may be much diminished and the percussion note becomes tympanitic.

When the bowels are very empty of gas the percussion note may be quite dull below the ribs, and because of this the lower border of the liver would be poorly defined.

## CONGESTION OF THE LIVER.

**Acute Congestion.**—This condition is not common and is hard to recognize clinically, and because of this it is probably more frequent in its occurrence than is generally supposed.

The sufferer looks dull and has a yellowish color, although there is no distinct jaundice.

The edge of the liver is often felt, there may be slight tenderness over the liver on pressure.

The urine is high-colored and may contain exanthem and uric acid, and occasionally a little bile pigment.

**Chronic Congestion ("Nutmeg" or "Cardiac Liver").**—This is a frequent affection and may be found in all cases of chronic cardiac failure, but more especially in diseases of the mitral valve and congenital affections of the heart.

The liver is usually decidedly enlarged and firm; the lower border is usually found about two inches below the free border of the ribs, sometimes as low as the umbilicus; the spleen is also enlarged; there is usually ascites with dropsy of the lower extremities. The cardiac affection shows its signs and general symptoms.

## JAUNDICE.

The old theories which considered that jaundice could be hæmatogenous from the breaking down of blood cells which were changed into bile pigment, or hepatogenous from the

suppression of the bile-formation function in the liver, have ceased to exist, and clinically the terms are never heard. At the present time jaundice is generally classified as "obstructive" and "toxæmic," although the theories as to the exact mechanical, chemical, and bactericidal phenomena are not susceptible of positive demonstration in the latter variety.

**Obstructive Jaundice.**—Causes operate by obstructing the lumen of the common bile-duct; these may be internal or external, the first being far the most important.

Internal causes are catarrhal inflammation of the duodenum or bile-ducts, gallstones, hydatids, distomata, or foreign bodies from the intestinal canal, and cicatrization of duodenal ulcer.

*Simple catarrhal jaundice* is the most common of all forms; it is usually recognized by the early signs of upset stomach, with pains near the pylorus which are more of a heavy, distressed feeling; in a day or two jaundice appears; the edge of the liver may be felt, but the gall-bladder is seldom made out. The urine is full of bile pigments and stools are clay-colored. Jaundice disappears in from one week to a month, or perhaps longer.

Jaundice due to obstruction from stones passing from gall-bladder to intestine or becoming impacted in the common bile-duct is quite frequent; when the stone passes through, the intense biliary colic and its sudden cessation, followed in a day by a very temporary attack of jaundice, make the diagnosis clear. When the stone becomes impacted, pain at first may be severe and cramp-like, but this ceases in a day or two; jaundice is persistent and intense; the liver becomes somewhat enlarged; the gall-bladder may become much distended, though not always; there are no signs of gastroenteritis, and the jaundice does not clear up as in simple jaundice.

Jaundice from impacted hydatids, distomata, or from the contraction of a cicatrix from duodenal ulcer are very rare and difficult to diagnosticate.

Jaundice from external pressure is not as common; the possible causes to look for would be tumors of the stomach, pancreas, duodenum, kidney, omentum, ovary or uterus, or the pregnant uterus.

Common features in jaundice are a slow heart, itching of skin, tendency to hemorrhage.

**Toxæmic Jaundice.**—Whether this is due to an increase in the amount of bile and its greater viscidity, which irritates and

swells the lining of the bile channel, or due to failure of the liver to absorb an excess of bile, still remains obscure. It is caused by some metallic poison, as phosphorus, toluendiamine, mercury, and arsenic; it may complicate some infectious diseases, as typhoid, malaria, scarlet fever, diphtheria, yellow fever; it is also a feature of certain obscure diseases, as acute yellow atrophy of the liver, Weil's disease, and malignant jaundice.

Jaundice from these causes can usually be distinguished by certain features; the color of the skin is seldom as deep as in obstructive jaundice, the stools contain bile, and urine is not as highly charged; the constitutional symptoms are more marked and graver.

Jaundice from metallic poisoning, of which phosphorus is the one most often seen, shows itself in a few days after the poison has been taken; it is not very deep; the liver is slightly enlarged and very tender; there may be hemorrhages into the skin or mucous membranes; the urine is scanty and may contain albumin, leucin, tyrosin.

Jaundice in typhoid fever, malaria, scarlet fever, and diphtheria may occur, but it is rare and does not seem to add much to the usual course of these diseases. In yellow fever it is a very serious matter and increases the symptoms markedly; high fever, hemorrhage, convulsions, black vomit, and death follow its appearance.

**Acute yellow atrophy of the liver** is very rare; the jaundice occurs in one or two days after the onset of symptoms; the liver dulness diminishes rapidly; there may be hemorrhages into the skin or mucous membranes.

The disease is most common in women, pregnant women being affected in about 25 per cent. of the cases. During the first four or five days symptoms may not be very marked. Change occurs suddenly with rapid collapse and ends fatally. The urine may contain leucin and tyrosin, and the uric acid and *urea* are greatly diminished.

**Weil's disease** (**acute infectious jaundice**) is uncommon; it is most common in young male adults.

The symptoms begin suddenly with fever, chills, vomiting. On the second or third day jaundice appears, with enlargement and tenderness of the liver and spleen; the urine is like that of acute nephritis. In from five to eight days the symptoms and signs diminish in intensity and recovery takes place in about two weeks.

## CIRRHOSIS OF THE LIVER.

There are several different forms which can be recognized clinically, although there has been and still is considerable confusion in the classification.

**Multilobular cirrhosis** is the commonest form met with; the fibrous tissue surrounds groups of lobules; in this form the liver is either increased or diminished in size; one lobe or one portion of the liver is apt to be affected to a greater extent than the rest, although very often the liver is uniformly affected.

The physical signs and diagnosis are not difficult even in early cases, and these are the cases usually met with in the out-patient clinics; to the educated eye perhaps the most valuable evidence is obtained by inspection, this requires good daylight to bring out the color, which is subicteroid; jaundice may be present, but only from complicating catarrh of the bile-ducts; besides the color the venules of the face especially are dilated and the veins of the rest of the body seem bluer and more noticeable; the liver is, in the great majority of cases, somewhat larger and seems firmer; the surface is not always rough; in many cases no enlargement is made out and in a few it seems smaller, but it is very difficult to determine a small diminution in the size of the liver.

The heart may be slightly enlarged; there may be signs of gastritis and of hemorrhoids.

Severe cases of cirrhosis do not all present the same signs; there seem to be two main factors in the causation of the symptoms and signs, and, although these work together more or less, yet the case is, as a rule, stamped with the features of one or the other. These factors are *mechanical obstruction* to the circulation through the portal vein, and *toxæmia,* either from loss of liver function or from increased intestinal ptomaine absorption. In either case the size of the liver may be large or small, but, as a rule, the small liver is associated with the obstruction to portal circulation and the large liver with toxæmia, but it may be *vice versa.*

There are certain symptoms in common; the appearance of the patient is stamped more markedly with the signs obtained on inspection in early cases; there is a deeper subicteroid hue; the venules and veins are larger; in late cases emaciation is the rule; if the liver is small, percussion is generally able to determine it;

sometimes tympanites prevents this, and so would excessive ascites; in moderate ascites, if the patient is rolled on the left side, the size of the liver can be determined; when the liver is large, palpation is the most reliable way to find it out; the edge is hard and often irregular; the surface is rough or quite nodular; the whole liver has lost its elasticity; sometimes either the left or the right lobe is relatively much larger than the other; it is possible that one lobe may be hypertrophied and the other in a condition of atrophy. When there is much ascites a large liver may be impossible to make out; but even with considerable ascites, if sharp, digging palpation with the tips of the fingers be made, the surface and edge can be felt.

Cases with toxic symptoms predominating always give cerebral, cardiac, gastric, intestinal, and nephritic symptoms and signs; there is mental dulness and sometimes stupor; the heart is enlarged and overacting; there is increased arterial tension; vomiting and diarrhœa are frequent; there may be blood in vomitus or in the stools; the urine shows signs of chronic nephritis; the spleen is enlarged, although it may not be palpable.

Cases with great obstruction to the portal circulation always give very marked and characteristic signs; there is great abdominal distention due to ascites; the spleen is much enlarged and easily felt, unless obscured by much ascitic fluid; chronic gastritis is the rule; hæmatemesis is not infrequent; bleeding piles are usually present; epistaxis is also frequent; the appearance of the abdominal veins is usually striking; as a rule they are much distended and very bluish; they are most marked about the flank, but very often the veins about the navel are much dilated, forming the so-called "caput medusæ;" the cause of the dilatation of these superficial veins is compensatory to carry off the blood which cannot go through the liver. A vein in connection with the round ligament anastomoses with the veins on the upper surface of the liver at one end, and at the other end with the veins of the abdominal wall at the navel; these connect with the deep epigastric and internal mammary veins, which finally carry the blood to the superior vena cava. Others run downward and anastomose with the iliac. It is important to remember other channels by which the blood returns to the heart when the portal vein is obstructed.

At the cardiac end of the stomach gastric veins anastomose with the œsophageal, which empty into the azygos.

The inferior mesenteric veins anastomose with the hemorrhoidal. Retroperitoneal veins anastomose with the lumbar.

When the abdominal distention is very great, intra-abdominal pressure on the inferior vena cava and the iliacs may produce some swelling of the lower extremities; extreme anæmia from hemorrhage or weakness of the heart may be another cause. It is astonishing to find in many of these bad obstructive cases a good heart, good kidneys, and good mental condition, and no less remarkable is it to see bad cases of cirrhosis go on for years without many toxic or obstructive symptoms.

**Fatty Cirrhosis.**—This variety does not differ from the preceding, in signs and symptoms, except that the liver is always large, sometimes enormous, and the duration of the disease is never very long.

**Unilobular or Biliary Cirrhosis.**—This form was well described by Hanot and Charcot. The cause is unknown.

The liver is always much enlarged; often it is enormous, weighing ten or fifteen pounds; its surface is smooth; microscopically there is diffuse fibrous tissue surrounding the individual lobules, and a wonderful plexus of apparently new bile-ducts embedded in this new tissue. The course of the disease is quite different from that of the multilobular form; its duration is seldom two years, and may be much shorter; there is no ascites, and seldom enlargement of the spleen; a daily rise of temperature and early and persistent jaundice are the chief distinguishing features. The patient dies with toxic symptoms.

**Syphilitic Cirrhosis.**—Acquired syphilis probably never attacks the liver, save in the form of gummata; these may be very numerous and diffusely scattered, or they may be arranged in groups forming nodules; gummata always end in caseation or cicatrization, and because of this result the liver may be furrowed with bands of fibrous tissue which contract and deform the outline; branches of the portal vein may be compressed, and symptoms of obstruction take place.

The signs are of enlarged, irregular, or nodular liver; especially is the left lobe apt to be affected; the liver may be tender; there may be ascites; the spleen may be enlarged from obstruction of the portal circulation or from numerous gummata.

Under treatment these cases may be cured, or they end fatally if not recognized, usually from severe anæmia or toxæmia.

In congenital syphilis the above form may take place, or there

is a diffuse fibrous hepatitis; this may be found in the stillborn, or it may occur in early infant life; the liver is enlarged and firm; there is no ascites; the child usually succumbs to gradual inanition.

**Malarial Cirrhosis.**—This form is uncommon in the North, but is of frequent occurrence in the South. Alcohol is probably a considerable factor; the spleen is usually very much enlarged; under antimalarial treatment and a change of climate cure results.

## ABSCESS OF THE LIVER.

Pathologically one may distinguish the tropical abscess from the amœbic, but it is impossible to distinguish an abscess which follows a blow over the liver, or some chance infection from the large intestine, from the tropical abscess; clinically these varieties are better determined by the history, the condition of the bowels, whether or not dysentery is amœbic or ordinary, and by the nature of the climate or country where the patient resided when the symptoms began.

Physical examination is seldom of much help in the diagnosis of the kind of abscess, but it is of all importance in determining whether an abscess is present. The general appearance of the patient is of great value; there is always pallor with a yellowish tinge to the skin and conjunctiva; there is usually some emaciation, with a sick look in the face.

Examination of the liver in a few cases shows absolutely no change. There is generally some tenderness; increase in size is usually upward, which can be made out by percussion and by Litten's phenomenon; there may be heard a few dryish rales or friction sounds at the base of the right lung; if the abscess breaks through the diaphragm and lung there may be marked dulness at base of lung, with feeble breathing and numerous subcrepitant rales; in these cases the very constant distressing cough, with the raising of sputa, either very full of pus or much like anchovy sauce, with a great deal of froth, is almost positive in its meaning.

Bulging of the ribs on the right side, with separation of spaces, with loss of rib substance, and finally fluctuation, is positive evidence of abscess of liver.

The abscess may enlarge downward; in such a case there is an evident enlargement of one of the lobes; there is considerable

tenderness; in a few cases a softened spot can be felt; there may be rupture into the peritoneal cavity, colon, or stomach. The use of the aspirating needle is safe enough when the condition is above the free border of ribs, but exploring into the liver through the abdominal cavity is very dangerous.

The progress of the signs in abscess of the liver is slow, usually covering a period of weeks or months, and sometimes longer than a year.

The difficult cases to diagnose are those which show no physical signs but have irregular fever, occasional chills or chilly feelings, general failure of health, pain in the region of liver, and pain referred to the right shoulder; these symptoms, with history of diarrhœa or dysentery in a hot climate, together with the examination of blood and of stools, should make the case clear.

When the liver dulness increases upward the signs may be mistaken for pleurisy with effusion; the area of dulness is less regular in its outline than pleurisy, unless the latter is sacculated; this is a valuable sign; the breath sounds are good to a lower level and change more abruptly than in pleurisy; there may be entire absence of subcrepitant rales or friction sounds, but this is not of much value; it is only their presence which rather points to pleurisy; there is no egophony at any time. The history and general appearance are often of more value than the signs.

When there is rupture into the pleural cavity or lung it would be difficult to tell the signs from empyema discharging through the lungs; the latter is rare, however, and the reddish, anchovy sauce colored purulent expectoration is more common in abscess of the liver; the history is of much value in these cases.

When the liver bulges downward into the abdominal cavity it may be mistaken for a tumor of the gall-bladder or hydatid cyst.

Tumor of the gall-bladder is usually softer, more movable, and less massive; the situation of the abscess is seldom at the exact point of the gall-bladder.

Hydatid cyst of liver may be in the right situation and feel very much like an abscess, but the history, general appearance, and symptoms should clear the case.

Liver abscesses are usually single, but are sometimes multiple.

## HYDATID CYST OF THE LIVER.

The disease is very rare in this country, but is of common occurrence in Australia. It is due to the tænia echinococcus.

The liver is always enlarged; in many cases the growth of the cyst is upward; it has been known to occupy most of the right chest; the heart may be very much displaced upward and to the left; there may be a marked bulging of the lower ribs on the right side; in the abdomen the growth may seem to come from either the left or right lobe or the whole liver may be involved; the swelling has been known to extend to the inguinal region; there is nothing characteristic on palpation; the surface is usually smooth, although in some places it may be a little more elevated or tumefied than in another; it feels elastic, though fluctuation is seldom obtained; the abdominal conditions most commonly confused with hydatid cyst are abscess of liver, distended gall-bladder, and cystic kidney; in abscess the constitutional symptoms, anæmia, and yellowish color are of more value than the local signs; in enlarged gall-bladder the position, shape, and mobility are of positive value; in cystic kidney its shape, mobility, and non-attachment to liver are usually sufficient to make a correct diagnosis.

In the chest, empyema or serous effusion are practically the only conditions to differentiate from hydatid; in the latter disease if it pushes upward it is usually in a dome-shaped manner; fluid is more or less flat at its upper level unless it is sacculated; in such a case the history of the onset and the constitutional symptoms are of more value than the physical signs. The use of the aspirating needle often has to be resorted to for diagnosis; if a non-albuminous fluid is obtained it must be from a hydatid cyst; the microscope may show the hooklets of the parasite or some of the lining of its wall.

The use of the needle in the abdominal cavity is seldom warranted and is bad practice; non-albuminous fluid could be obtained from a gall-bladder or hydronephrosis; other characters, however, would probably distinguish fluid from either of these sources.

## TUMORS OF THE LIVER.

Primary tumors are exceedingly rare; benign tumors are practically never seen; malignant tumors are most always carcinomatous, but sarcomata are sometimes found.

**Cancer of the liver** is a common affection; secondary deposits in the liver occur in nearly 50 per cent. of all cases of carcinoma; the great bulk of these are secondary to cancer of the stomach

and the large intestine and uterus; these secondary growths, as a rule, add no special feature to the course of the original disease, although in many cases the liver condition assumes a prominence greater than the original affection, the site and distinctive symptoms of which may never have been recognized before death.

In all cases of cancer the liver should be examined from time to time, as a growth may be discovered without there being any symptoms to attract one to the liver.

The signs which are most characteristic are persistent jaundice and a tumor connected with the liver or a general, but somewhat irregular, enlargement of the liver.

Jaundice is of frequent occurrence and is due to pressure on the bile-ducts or involvement of the ducts with the cancerous growth; the jaundice is persistent and with the anæmia forms a greenish-yellow color to the skin; there is evidence of itching of the skin, and there may be hemorrhages from the mucous membranes.

Examination of the liver in many cases is negative, but frequently a hard, irregular projection is made out at the lower border, more commonly at the site of the left lobe; but a general enlargement with a massive feeling, with an irregular or nodular surface, is often found; there may be a fairly uniform enlargement with smooth surface, and with a fairly soft consistence to the edge or to whatever portion of liver that can be felt; in these cases the carcinoma is situated centrally.

Tenderness over the liver may be very marked; this seems to be due to the inflammation of the peritoneum adjacent to the growth; tenderness may vary from time to time, but is usually present at some period of the disease.

Ascites and enlargement of the spleen owing to pressure on the portal vein may occur, but not very frequently.

Cachexia and emaciation in most cases are progressive, but the general appearance and condition is often very deceptive; when the disease is well marked and under observation one is often astonished at the good appearance of the patient, which keeps up for a long time; in some cases the disease may not be recognized and hardly suspected, when the patient is seized with fever and toxic symptoms and dies suddenly. Autopsy reveals a cancer of the liver, and, perhaps, a small one of stomach or intestines; of course, these patients have shown some symp-

toms and deterioration in health, but none sufficient to make a positive diagnosis upon.

When the physical signs of carcinoma are present, alcoholic cirrhoses and syphilitic cirrhosis are the conditions which may lead to error in diagnosis; on mere physical signs it may be impossible to differentiate between them, but, as a rule, in cancer the liver is harder and the nodules larger; on the other hand, alcoholic cirrhosis may affect one lobe markedly, the surface of which is somewhat nodular; while in syphilitic cirrhosis this is more frequent, the absence of the other signs and the history of alcoholism or syphilis in many cases is of great help in diagnosis. The absence of marked cachexia or emaciation is of much less value than its presence.

**Primary Carcinoma of Liver.**—This is not as rare as formerly believed, its course and symptoms are like the secondary growths.

**Sarcoma of the Liver.**—Sarcomatous growths are infrequent; they are usually secondary.

The melanosarcomata are most distinctive in symptoms and signs; they are rarely primary, but are most always secondary to melanosarcomata of the eye or skin.

The signs are of a large, irregular, nodular growth of liver, which usually becomes much larger than cancerous growths; they may attain the weight of thirty pounds.

Jaundice, emaciation, and cachexia are regular features; ascites and enlargement of the spleen may occur.

# CHAPTER XII.

## DISEASES OF THE GALL-BLADDER AND BILE-DUCTS.

### CATARRH OF GALL-BLADDER AND BILE-DUCTS.

**Acute Catarrhal Inflammation of the Bile-ducts and Bladder.**—It is generally supposed that this condition is secondary to gastro-duodenitis, but as cases do not come to autopsy it is impossible to be sure of this; the signs have already been described.

**Chronic Catarrh of the Gall-bladder.**—This condition is by no means rare; the gall-bladder is filled or distended with thick, ropy mucus and bile; the diagnosis is made by the symptoms of colicky pains in the right hypochondrium, which may not be very severe; the gall-bladder is sometimes felt and may produce a tumor of considerable size; there is no jaundice; constipation may be obstinate. It is very difficult to tell these cases from cases of gallstones which remain in the gall-bladder. Sometimes the bladder empties itself.

**Chronic Catarrh of the Bile-ducts.**—This is probably of rather frequent occurrence, but does not always give symptoms; sometimes there is slight jaundice or a yellow, bilious look, but there is no pain or tenderness and no enlargement of the gall-bladder.

**Suppurative Catarrh of Bile-ducts** (Suppurative Cholangitis) **and Gall-bladder** (Empyema of the Gall-bladder).—Empyema of the gall-bladder is not of frequent occurrence; it is usually seen when gallstones are present in the bladder; it may follow chronic catarrh.

A tumor is sometimes felt which conforms to the signs of an enlarged gall-bladder; it is usually quite tender; there may be some thickening around it from local peritonitis; the history of fever and chills may be obtained; the course of the signs may be quite slow; it may rupture externally, into the peritoneal cavity or large intestine.

**Suppurative Cholangitis.**—This condition is usually secondary to an impacted stone in the common bile-duct or to carcinoma of the common bile-duct; there is uniform enlargement of the

liver, which may descend to the level of the umbilicus; the gall-bladder, if atrophied and contracted from old stones, may not be enlarged, otherwise it would be. There is deep and constant jaundice, chills, fever, and constitutional symptoms of severe character.

## ULCERATION OF GALL-BLADDER AND BILE-DUCTS.

This is most commonly due to gallstones; the perforation may be into the abdominal cavity or into the colon or small intestine, which have become adherent.

In typhoid fever ulceration of the bile passages has been seen a number of times; the diagnosis of ulceration and perforation is difficult; the history of an impacted stone, or the presence of an old and distended gall-bladder, or enlargement of the gall-bladder in typhoid fever, are aids to the diagnosis. In cases which rupture into the peritoneal cavity there may be severe pain, shock, and, perhaps, evidence of hemorrhage; abdominal distention may follow, and fluid be discovered in the peritoneal cavity.

When the bowel is perforated the stone may be passed; sometimes intestinal obstruction occurs at some lengthy period after the stone gets into the bowel.

## ACUTE PHLEGMONOUS CHOLECYSTITIS (GANGRENOUS CHOLECYSTITIS).

This may occur with gallstones in the bladder, or when there is simple distention, and rarely without any previous abnormal condition.

The diagnosis is made by the occurrence of very severe and constant pain in region of the gall-bladder, fever, rapid pulse, great shock, obstinate vomiting, and constipation. Physical examination shows great resistance and tumefaction in the region of gall-bladder, with rapid distention of abdomen, which is at first tender near the gall-bladder, but soon becomes general, with signs of peritonitis.

## DISTENTION OF THE GALL-BLADDER.

The causes are from bile which accumulates in the bladder owing to stoppage of the common bile-duct, or mucus from

catarrhal inflammation of gall-bladder, or from gallstones in the bladder; in cases where there has been stoppage of the common bile-duct for a considerable length of time, bile is always replaced by mucus; pus from infection of a previously unhealthy gall-bladder which contains stones, or mucus from catarrhal inflammation, produces the so-called "empyema" of gall-bladder.

The diagnosis of a distended gall-bladder is often very simple, particularly so when the abdominal walls are thin and the bladder is not very large; a pear-shaped tumor originating about the ninth right rib at the junction with its cartilage, which feels soft and elastic, rising and descending with respiration, could hardly be mistaken for anything else. When the tumor is of large size and is quite firm it may often be confused with a movable, perhaps enlarged right kidney, tumors of the kidney or suprarenal capsule, tumors of the large intestine with intermittent fecal obstruction, tumors of the pylorus, or an abnormal projection of the liver.

The size to which a distended gall-bladder may attain is very variable; it has reached as low as the pelvis and been mistaken for an ovarian cyst; as a rule it seldom becomes larger than twice the size of an ordinary incandescent electric-light bulb.

The features which are most suggestive of a gall-bladder tumor are: its superficial nature, but in very thick abdominal walls this cannot be correctly appreciated; its shape, but this is not preserved in large distentions; its mobility, which corresponds to the respiratory movements of the liver; and, finally, its apparent connection to the liver, so that when the tumor is grasped between the hands and held down toward the pelvis during expiration, it tends to ascend and leave the grasp; this character would seem valuable, but it is by no means constant. The author has seen cases which held by the grasp were immovable during expiration without the slightest pull being apparent; then again there are movable kidneys which slip from the grasp during expiration. Variability of the size of a distended bladder is not uncommon; this is due to the emptying of its contents; this change in size is deceptive because a cancer of the colon in the position of gall-bladder may cause intermittent fecal accumulations, which, in a rather tense abdominal wall, may feel exactly like a distended gall-bladder, and then disappear as if the gall-bladder had emptied itself; a hydronephrosis or pyonephrosis may also vary in size.

A tongue of liver usually occurs in women; it may be attached by a pedicle to the liver; its shape and edge are usually sufficient for diagnosis, but there may be error in thick abdominal walls.

Tumors of the pylorus are usually easily distinguished by position, hardness, and irregularity.

## CANCER.

**Cancer of the Gall-bladder.**—This condition is rare by itself; it may follow impacted stones or irritation from ulceration.

A hard, irregular cancer in time may be felt in situation of the gall-bladder; the liver or the peritoneum usually becomes involved.

**Cancer of Bile-ducts.**—The common duct is most frequently attacked; there is persistent jaundice, emaciation, and cachexia. Occasionally acute cholangitis supervenes. A tumor is seldom felt; the diagnosis is made by the age, emaciation, and cachexia, but this condition may be very hard to tell from an impacted stone in the common bile-duct.

The gall-bladder is usually enlarged.

## GALLSTONES.

These occur mostly in women over thirty; pregnancy seems to have considerable influence in their formation. It is estimated that gallstones are found in 5 to 10 per cent. of the bodies examined by autopsy. Many cases of stones in the gall-bladder have been found which never gave symptoms or signs during life. The diagnosis of gallstones in straightforward cases is usually simple, but there are many conditions to be confused with atypical symptoms.

In simple cases, when the stone passes from the gall-bladder or hepatic ducts into the common bile-duct, and from there into the duodenum, pain in the right hypochondrium, radiating especially to the back about the right scapula, but sometimes downward over the abdomen, is a very constant feature; there is usually tenderness in the region of the gall-bladder; vomiting is almost always present during the pain; when the pain ceases it does so suddenly. If the attack has been of some duration, jaundice regularly follows in from one to two days after the cessation of pain. Attacks of this character may be repeated at frequent

intervals. Jaundice is always an uncertain feature, but pain is very constant. Slight enlargement of the gall-bladder is sometimes seen during an attack.

In acute cases with severe colic, without jaundice, other conditions may simulate the attacks.

**Acute indigestion** with severe pain referred to the region of the gall-bladder, radiating to the back and over the abdomen, is often impossible to differentiate from biliary colic; in either case relief may follow vomiting; the history of having taken indigestible food is of much value; the absence of tenderness over the gall-bladder is also of value.

**Renal colic** with the stone remaining in the pelvis of the kidney may simulate biliary colic; as a rule the pain is deeper and radiates downward to a greater extent; urinary changes are usually present.

**Lead colic** may be mistaken for biliary colic; the pain is usually duller, more in the pit of the stomach; the presence of lead line and the history will usually make the case clear.

When the gallstone becomes impacted in the common bile-duct the signs are rather characteristic.

Persistent jaundice is most important; this may vary in intensity, often becoming deeper after a malarial-like paroxysm; there are some cases of impacted stone where the duct enlarges around it and bile is able to get by.

The gall-bladder in impacted stones becomes distended unless its coats have become thickened and contracted; having become distended, immediately after the stone is impacted, it may in time reduce in size and contract.

Impacted stone must often be distinguished from cancer of the common bile-ducts or head of the pancreas; in the latter case the absence of ague, paroxysms, the emaciation, and cachexia are the most important points; in many cases an exploratory laparotomy is necessary.

When the stones remain in the gall-bladder frequently there is distention of the gall-bladder with mucus; this condition may persist; colicky pains are not uncommon, or a feeling of weight and discomfort on the right side; ulceration and perforation into the peritoneal cavity, intestine, or pelvis of the kidney may occur. Empyema of the gall-bladder sometimes results. Phlegmonous cholecystitis is of rare occurrence.

The gall-bladder in most instances does not distend, but its

walls thicken and contract. Calcification of the wall has been known to take place.

In these thickened, contracted bladders ulceration occasionally occurs; as a rule they remain without giving symptoms.

## CHOLANGITIS.

Infective inflammation of the bile-ducts is almost invariably due to the irritation of gallstones, which allows of the development of the germs of inflammation; in most cases the inflammation is not of serious character. If a gallstone is impacted in the common bile-duct there may be paroxysms which are like those of malaria; if jaundice is not already present it usually follows the attacks; if it is present at the time of the attack it deepens after the paroxysm. These attacks may persist, off and on, for years, but may end in recovery.

**Suppurative cholangitis** is of very serious character; it may follow the simple form of cholangitis, impacted stones being the most frequent cause; it is sometimes secondary to cancer of the common bile-duct or hydatid cyst of the liver, and has been known to complicate typhoid fever or epidemic influenza.

It begins with fever and chills, which are usually a persistent feature. Jaundice is almost always present; the liver becomes large and tender; abscesses of the liver may arise; pleurisy, empyema, or pneumonia are frequent complications. It is usually fatal; early operation may cure.

# CHAPTER XIII.

## DISEASES OF THE PANCREAS.

THE pancreas when in normal condition cannot be made out by percussion or palpation; affections of this gland are rare, and their diagnosis is difficult because of our unfamiliarity with them.

### HEMORRHAGE OF THE PANCREAS.

Traumatism seems the most frequent cause of severe hemorrhage; it is supposed, however, that there must be a predisposition or some trouble with the bloodvessels in some of the cases.

The diagnosis is made by the occurrence of sudden pain or an indescribable sensation of weight or constriction in the epigastrium; gastrointestinal symptoms are usually lacking; shock, with dyspnœa, feeble pulse, and cerebral symptoms soon ensue; the cases end fatally in a few hours.

### PANCREATITIS.

**Acute Gangrenous Pancreatitis and Acute Suppurative Pancreatitis.**—Although the morbid anatomy of these conditions is distinct, the course and occurrence of the disease are very difficult to separate, while the symptoms are practically the same.

The diagnosis is made by the occurrence of sudden intense pain in the epigastrium, which, after a little while, becomes diffuse over the abdomen; vomiting soon follows the pain; chills and fever are usually present, but there may be no marked rise of temperature. In the suppurative form fever may be very irregular. Slight jaundice is sometimes seen; albumin and casts are usually found in the urine.

The epigastrium is very tender and a fulness or tumor-like resistance is felt in the region of the pancreas. The abdomen is tympanitic and somewhat distended, especially in the upper part.

These initial symptoms may be followed by local peritonitis over the pancreas; a tumor of some size may develop in this region. After a few weeks there may be sudden sharp pain, the tumors may diminish in size, and a purulent discharge comes from the bowels; in this way cure may result.

In prolonged cases local inflammation continues, ascites takes place, general dropsy is sometimes seen, and occasionally sugar is found in the urine.

Perforation of a gastric ulcer or acute intestinal obstruction may simulate this affection very closely in its early stages. In perforation of the stomach, preceding history, sex, age, the absence of fever at the onset, its greater frequency, all add to the probability of ulcer.

In acute intestinal obstruction, tenderness and tumefaction are seldom seen in the epigastrium; distention of the abdomen occurs earlier; there are seldom chills or fever in the beginning. The bowels do not move.

**Chronic Pancreatitis.**—This is a very rare condition; it may follow catarrhal inflammation of the pancreatic duct; it is a very difficult affection to diagnose. A deep, boring, often paroxysmal pain and tenderness in the lower part of the epigastrium with considerable resistance is sometimes felt; diarrhœa frequently exists; there may be undigested fat in the stools; glycosuria is occasionally found, and diabetes mellitus may result.

## PANCREATIC CALCULI.

This affection is seldom seen and hardly ever recognized, but the subject is one requiring attention. Attacks of paroxysmal pain in the lower part of the epigastrium radiating to the left and downward, followed by the passage of a stone which is usually composed of carbonate of lime, is very good evidence; paroxysmal pains in same region without jaundice, even if stones are not found, may suggest pancreatic calculi; in addition to the attacks there may be loss of flesh and strength, passages may be loose and contain abundant fatty acids, glycosuria may occur. Cystic tumors may develop from a plugged duct.

## CYSTS OF THE PANCREAS.

Numerous examples of this condition have been seen; it is supposed that they originate in most cases from dilatation of the duct of Wirsung, but probably they may arise from the gland tissue or in some cases are outside of the gland and follow acute pancreatitis.

The diagnosis is made almost altogether on the physical signs of the tumor and not by the symptoms. On inspection a marked rounded prominence may be noticed in the epigastric and umbilical region; palpation outlines a rounded, smooth, elastic tumor, which may extend as high as the ribs and as low as the hypogastrium; it is slightly movable; as a rule, unless the tumor is very large, there is a tympanitic area between the tumor and the liver; distention of the stomach may show it to be above and in front of the tumor; distention of the colon shows it to be below and in front of the tumor; an exploratory puncture, which is seldom advisable, may withdraw a clear or bloody alkaline fluid, which emulsifies fats, digests albumin, and may change starch into glucose.

The tumor has to be differentiated from an echinococcus cyst of the pancreas, a collection of fluid in the lesser peritoneal sac due to pancreatitis, traumatism, or perforation of the stomach or duodenum.

In inflammatory conditions the fever is of help in the diagnosis; in echinococcus cysts exploration is the only possible way of making sure of the diagnosis; this is better done by laparotomy than with the exploring needle.

## CANCER OF THE PANCREAS.

It is estimated that 6 per cent. of all cancers occur in the pancreas. The head of the pancreas is usually affected; adjacent organs, tissues, and glands are usually affected from extension of the growth. The diagnosis may be very difficult unless the tumor is felt, which is possible in not quite one-half of the cases; this tumor is situated deeply and is not movable; it may be very hard and nodular.

Jaundice is frequent from pressure on or involvement of the common bile-duct.

Pain is felt in about one-half of the cases; it is continuous or paroxysmal.

The gall-bladder may be enlarged from pressure on the common bile-duct; there may be dilatation of the stomach from partial obstruction of the duodenum. Complete obstruction at that point may give the symptoms of acute intestinal obstruction. The stools may show fat acids and undigested meat fibre. Rapid emaciation and marked cachexia are the rule.

# CHAPTER XIV.

## DISEASES OF THE SPLEEN.

### THE NORMAL SPLEEN.

The normal spleen is practically impossible to make out by physical examination; it lies beneath the ninth, tenth, and eleventh ribs on the left side, its anterior border reaches to a line drawn between the tip of the eleventh rib and the left sternoclavicular articulation; when the abdominal wall is thin and relaxed the edge is sometimes felt.

The spleen is sometimes in a lower position from enteroptosis; very occasionally it is found in other regions of the abdomen in the so-called cases of "wandering spleen."

### ENLARGEMENT OF THE SPLEEN.

**Methods of Determining Enlargement of the Spleen.**—There are so many conditions which are accompanied by enlargement of the spleen, some due to organisms and toxins and others to congestion, that the importance of being able to determine the size of the spleen is most essential in physical diagnosis.

Inspection is seldom of value; in very large spleens there may be slight bulging and prominence of ribs and soft parts below their free border on the left side, and if the abdominal wall is thin, the spleen under these circumstances may be seen to move with the respiratory movements.

Palpation is by far the best means of making out enlargement of the spleen; it only fails in cases where there is great muscular resistance from tenderness or sensitiveness. The tips of the fingers are first employed to appreciate the resistance that the splenic body might give if below the ribs; moderate digging pressure will make this apparent; after this is done the patient is made to take deep inspirations and encouraged to relax the abdomen. The region below the border of the ribs is explored with the tips of the fingers and whole hand; the fingers must

be pushed into the abdominal wall with a varying pressure; they are held firmly and pressed a little deeper and upward as the patient inspires; as soon as resistance is well felt, the fingers are suddenly raised upward so as to jump the edge of the spleen; in many cases of large spleen, if the abdominal wall is thin, the edge can easily be felt by ordinary palpation; in some cases of enlarged spleen the edge is turned inward and the round outer surface presents itself against the fingers and not the edge; when the ribs are elastic, forward pressure with the left hand against the ninth, tenth, and eleventh ribs behind will bring the spleen forward and allow of better appreciation of its edge. This is especially valuable in children.

Percussion is unreliable, but may be of positive value when resistance prevents palpation.

The patient must always be placed on the right side, and a line must be drawn between the left sternoclavicular articulation and the tip of the eleventh rib; if there is dulness in front of this line over a triangular space marked by the lower border of the eighth rib and the free border of the ribs, it is, in most cases, due to the large spleen. The spleen may be enlarged and yet the note is not dull in some cases owing to much distention of stomach and colon with gas; dulness in some cases may be due to a new-growth in colon or to an enlarged kidney.

In very large spleens the characteristic notch may be felt; otherwise it is the shape of the body and characteristic edge which determines its nature.

An enlarged spleen is seldom mistaken for any other condition, although with thick abdominal walls a new-growth in the colon or fundus of the stomach and an enlarged kidney or tumor of the kidney have been confounded with splenic enlargement; the differentiation of these conditions would be clear enough if palpation were always satisfactory; as this is the difficulty, one must rely mainly on the history and symptoms for the diagnosis.

Primary splenic enlargements are very few; malignant growths are very rare, and benign tumors are practically never seen.

The spleen of chronic congestion cannot be recognized or proven to always be a large one; although the spleen is enlarged in most cases of cirrhosis, it is not so in all, and there does not seem to be any constant relation between the size of the spleen and the amount of the venous congestion; whether the cause

of the enlargement is a toxic substance in these cases, or really is the congestion which the spleen in many cases tolerates and in others does not, has not been clearly shown. Congestion from an incompetent heart, in the majority of cases, according to autopsy, shows no enlargement of the spleen; it seems rather strange, however, that during life many, perhaps the majority, present an easily palpable spleen; it is very likely that during life the organ may be much larger than it seems after death, owing to the blood engorgement or, perhaps, the spleen in time may accommodate itself to the pressure, or in those cases where it is much enlarged there may be a toxæmia.

**Malarial Spleen.**—There are very few genuine cases of malaria where the spleen cannot be made out to be enlarged, but there are a few. In old chronic cases the spleen may be enormously enlarged—the so-called "ague cake."

**Leukæmia.**—The spleen in this condition is usually very large; it is sometimes felt in the inguinal region of the opposite side; the notch, as a rule, can be appreciated.

**Splenic Anæmia.**—This is a disease which is not yet firmly established; the diagnosis is made, as a rule, by exclusion; nothing in the blood is characteristic; the size of the spleen is usually considerable.

**Lardaceous Disease.**—The spleen is the organ most commonly attacked; there are two forms, the "sago" and the diffuse, waxy variety; in the latter variety the spleen is larger and heavier than the former.

**Syphilitic Spleen.**—In the secondary stages there is apt to be a very slight enlargement, barely recognizable. In the tertiary form there may be a diffuse splenitis, with increase in the fibrous tissue and general enlargement from lardaceous disease, but most commonly gummata produce the enlargement; these are usually diffuse, anywhere from the size of a bean to a walnut, producing uniform enlargement, or the gummata may be large and coalescent, producing nodules and bosses on the surface.

In congenital syphilis there is apt to be general enlargement due to fibrosis and lardaceous disease, but gummata are also found occasionally.

**Tuberculous Spleen.**—In acute miliary tuberculosis this organ may be affected with scattered miliary tubercles. In chronic tuberculosis occasionally caseous tuberculous masses aro found in the spleen.

**Abscess of the Spleen.**—It usually owes its origin to septic infarcts, sometimes seen in tuberculosis and pyæmia. The spleen is large and tender.

**Malignant Growths.**—Secondary carcinomas have been recorded; primary sarcoma has occurred.

# CHAPTER XV.

## DISEASES OF THE KIDNEY

### THE NORMAL KIDNEY.

The normal kidney, as a rule, cannot be made out by percussion or palpation. Percussion, posteriorly, sometimes determines a relatively dull area opposite the spines of the last two dorsal and upper two lumbar vertebræ; when the muscles are well developed this is impossible, and in no case is it absolutely reliable in making out whether the kidney is smaller, larger, or displaced.

Palpation in women with thin, relaxed abdominal walls, often makes out the lower pole of the kidney, especially on the right side.

### ENLARGED, DISPLACED AND MOVABLE KIDNEY.

**Methods of Determining Enlarged, Displaced, or Movable Kidney.**—It is rather a notorious fact that some examiners seem able to discover the normal or movable kidney very frequently, while others rarely meet with them; this great discrepancy must be due either to faulty methods of examination or poor tactile appreciation, because these conditions are common, especially in women. Bimanual palpation is much the best method; the left hand is placed posteriorly below the eleventh and under the tip of the twelfth rib, and the middle, ring, and fore fingers are pushed forward and upward and held comparatively stationary; the right hand is used in front below the free border of the ribs and to the outer side of the rectus muscles; this is the active movable hand and with it gentle and forcible palpation is carried on; if a body is felt, effort is made to get it between the fingers of both hands so that its size and surface can be appreciated; when this is done one should try to move and slip the body in different directions; as a rule, the key to the situation is the help obtained by deep inspiratory movement;

by such movements the tip of the kidney or the whole kidney is brought within the grasp of both hands; if the whole kidney is grasped it may be held down during expiration or may be moved around with more or less facility.

Another method which may be used to appreciate the kidney is by employing one hand, the thumb being pressed up and forward below the eleventh rib, while the other fingers of same hand are used in front below the ribs; if the patient is small and not fat, and has fairly relaxed abdominal walls, the kidney can be caught very nicely during deep inspiration, and as it slips over the fingers its size and surface are very plainly made out; but while this method in a few cases might be ideal, in the great majority it cannot be of much service.

## NEPHRITIS.

**Acute Nephritis.**—Very little difficulty can be experienced in making a diagnosis of this condition if the urine is examined, but there are mild acute cases which could readily be overlooked in physical examinations.

Dropsy is a sign of great value; it may be the first thing to attract attention to the case; it is not usually confined to the lower extremities; the hands, arms, and face are very commonly affected; it is the puffiness around the eyes which one should be attracted by, especially in young subjects; dropsy may be exceedingly severe; there may be fluid in the abdomen and thorax; in mild cases dropsy is absent.

Anæmia is an almost constant accompaniment of this condition; in cases of pretty long duration it may be exceedingly severe.

The heart and pulse at first may be only frequent; increased arterial tension is soon discovered in most of the cases, but the pulse may always be soft. Accentuation of the second aortic sound is not usually present to any marked extent in acute cases; enlargement of the heart may, and usually does, occur after a few weeks.

Constitutional symptoms are not particularly characteristic; in very severe cases, nausea and vomiting, dyspnœa, frequent feeble heart action, stupor and delirium; in moderately severe and light cases there may be few constitutional symptoms; lassitude and gastric symptoms are probably all that show them-

selves. The eye may give important information from acute neuroretinitis or nephritic retinitis.

The urine is the most important guide to the diagnosis, but one cannot always tell the degree of severity by the urine; the amount of suppression and diminution of urine in the early stages is a good guide to the severity; the amount of albumin which is usually very large, does not, as a rule, depend on the severity or seriousness of the kidney lesion, although it is a fair guide to the progress of the acute cases; the presence of casts is to be expected, but by themselves one can form only a general idea of the kidney condition; diminution in the total amount of urea is generally present, but is not so important in the acute as in the chronic cases. The duration of the signs of acute nephritis, if recovery takes place, is, as a rule, one or two months, but some cases run for a year, and even then recover. Many cases go on to chronic nephritis.

**Chronic Nephritis.**—Two well-defined types of this condition are readily separated; other cases have some features of both.

(*a*) CHRONIC NEPHRITIS WITH EXUDATION.—In these cases dropsy is a frequent symptom; it may come and go with exacerbations, when there may be general anasarca with ascites and hydrothorax. Anæmia is usually marked. The pulse is usually increased in tension, but may be soft. The heart is hypertrophied and dilated. The eyes show nephritic retinitis. The urine varies in amount, sometimes diminished, often increased; albumin is always present, sometimes in large amounts. All kinds of casts are found. The amount of urea is somewhat diminished.

Constitutional symptoms are chiefly from dyspnœa, due to weak heart and anæmia. Dyspepsia or gastritis and debility are usually present. In bad cases the condition known as chronic uræmia may occur; the patient gets drowsy, stuporous, or comatose; there is nausea and vomiting, severe dyspnœa, and very bad headaches; the urine becomes scanty; this condition may last a few days or a week, and usually ends in death.

(*b*) CHRONIC NEPHRITIS WITHOUT EXUDATION.—The picture of this condition is quite different from the previous course of the disease; the striking features here are the heart and blood-vessels, large amounts of urine without albumin, but with small amounts of urea, bad headaches, dyspnœa, and acute uræmia.

The heart is always hypertrophied, sometimes enormously so;

dilatation may take place and the heart may break down and be the final cause of death, but this is exceptional. The first sound is strong until much hypertrophy has taken place, when it is muffled. A murmur systolic in tune is sometimes heard at the apex, from relative insufficiency of the mitral valve. Over the aortic area, and transmitted upward, a systolic murmur, due to roughening of the valves or arch of aorta from endarteritis, is sometimes heard; the aortic sound is accentuated, often ringing. Endocarditis sometimes complicates this disease and gives special mechanical symptoms according to the valve affected. The arteries are thickened and the arterial tension increased; the amount of tension varies, often coming on in attacks lasting hours or days. Dropsy is absent.

The urine is abundant; the amount is often as much as four quarts in twenty-four hours; a trace or small amount of albumin is sometimes found; there may be a few hyaline and granular casts. The urea is usually less than three hundred grains in twenty-four hours. The urine may be normal at times.

Dyspnœa is a valuable symptom; in many cases it is constant and distressing; in others, in addition, there are severe attacks of dyspnœa which is due to contraction of the arteries; there may be very little dyspnœa in some of the cases.

Headaches are very severe at times, especially when the tension is increased; there may be a constant dull ache, or it may be prostrating.

Attacks of nausea and vomiting are not uncommon.

The eyes may show nephritic retinitis, they frequently do not; in some cases there is hemianopsia or blindness, without showing many changes in the retina.

The color of the skin is pale in some cases; pallor of the tongue may be a marked and valuable sign, because the skin is apt to be dusky and show little anæmia. Mental changes in time may take place; forgetfulness, irascibility, slight delusions, and dementia are occasionally seen.

"Acute uræmia" takes the form of muscular twitchings or general convulsions, which last a few minutes, occur in single or repeated spells, followed by confusion and a return to former conditions, or death may take place during an attack, or the patient may pass into the chronic uræmic state and die.

The disease is insidious in most of the cases; an attack of acute uræmia may be the first symptom as well as the last; as

a rule, when the disease has advanced the symptoms and physical signs are very characteristic.

There are a great many cases of chronic nephritis which do not conform to either of the types described; there are cases which present some of the characteristic features of both; at times one set of symptoms is most marked, while at others another set is more prominent.

The urine, if constantly watched, usually shows at some time small amounts of albumin, hyaline or granular casts.

## LARDACEOUS DISEASE OF THE KIDNEY.

This is a part of a general affection with special kidney symptoms; the amount of urine is generally abundant and albumin is present in small quantities. Casts are generally present; they are often waxy. Dropsy is present in most of the cases; sometimes there is ascites; the patients may die of uræmia; the features which make the diagnosis in these cases are not the urinary symptoms, but the history of a long wasting disease, either tuberculosis, syphilis, or malignant, although it is not frequently seen in the latter affection. Alcoholic history is very frequent.

Physical signs show emaciation, pallor, and waxy look; the liver and spleen are both considerably enlarged; œdema of the lower extremities is commonly present, more from the general condition rather than from the kidney affection.

The heart is rapid and feeble; there is always a marked hectic type of fever. The course of the disease extends over many months.

## TUBERCULOUS INFLAMMATION OF KIDNEY.

Acute cases are a part of a general miliary tuberculosis and gives no special symptoms or signs.

Chronic cases are almost always secondary to tuberculosis of the bladder, prostate, seminal vesicles, or testicles; primary cases are occasionally seen. One kidney is generally affected.

The kidney is never much enlarged; it may be tender; blood and tubercle bacilli are sometimes found in the urine; there is fever, sweating, and emaciation.

The kidney in some cases can be palpated.

## PYELITIS AND PYELONEPHRITIS.

These affections are frequent from infection ascending from bladder and urethra, or set up by the irritation of a stone in the pelvis of kidney. The diagnosis is made largely by the urine, which is increased in quantity, frequently acid in reaction, although in advanced cases it is alkaline; the color is pale and opalescent; it contains albumin, pus, and sometimes casts.

Constitutional symptoms are usually indefinite; those of dyspepsia may be the most marked; acute or chronic uræmia may occur in bad cases.

Physical examination may show very little; anæmia is usually present; the heart may be enlarged, the second aortic sound accentuated, and the pulse increased in tension.

The kidney is very seldom enlarged; there are some cases in which a characteristic tumor may be felt; this tumor in a few cases diminishes in size rather suddenly; at the same time there is a marked increase in the pus found in the urine; after a time the tumor increases again in size.

Acute pyelitis, chiefly of gonorrhœal infection, produces acute congestion of kidney, diminished or suppressed urine, and the symptoms of chronic uræmia. Occasionally cases recover and chronic pyelitis results.

## HYDRONEPHROSIS.

Many of these cases are congenital in origin owing to defects of ureters or the urethra; cases which are not congenital are caused by pressure on the ureters by tumors, etc., stoppage of its lumen by a stone, or from strictures of the urethra and enlarged prostate.

The prevention of the escape of urine from the kidney causes distention of its pelvis and in time destruction of the kidney tissue; in most cases the kidney does not enlarge, but it frequently does and sometimes its capsule is stretched and becomes enormously distended with fluid, the character of which is watery, containing chlorides, traces of urea, and epithelial cells.

Diagnosis is made almost entirely on the presence of a tumor in the kidney region; there may be no symptoms if the other kidney is normal, so the condition would not be suspected

unless the tumor be felt; if this is small its feeling is rather characteristic, as has already been described.

When the tumor is very large it may be mistaken for pyonephrosis, hydatid cyst of liver, or spleen, or kidney, encysted peritoneal fluid, or an ovarian cyst.

From pyonephrosis it may be told by the absence of symptoms, although it is often impossible to distinguish between them.

Hydatid and serous cysts of kidney are very difficult to distinguish save by the history of a good cause for hydronephrosis.

Encysted peritoneal fluid is usually tuberculous and gives rational symptoms. Ovarian cysts with long pedicles may resemble this condition, but they are more movable, as a rule, and lie in front instead of behind the intestines; examination of the uterus usually shows it to be displaced in ovarian cyst and not hydronephrosis.

In some cases the tumor in hydronephrosis becomes suddenly smaller and a large amount of pale water is passed; it may fill up again and do this intermittently. Sometimes both kidneys are affected with hydronephrosis; this naturally is soon fatal.

Congenital cases are frequently double from imperforate urethra; they are always fatal.

## PYONEPHROSIS.

This condition is usually secondary to hydronephrosis, suppuration having taken place in the sac; if the obstruction is intermittent there may be a discharge of pus in the urine with diminution in the size of the tumor; as a rule the obstruction is constant, and if the opposite kidney is normal the character of the urine is good; in prolonged cases the normal kidney usually becomes affected with a chronic interstitial inflammation.

The signs of pyonephrosis are practically the same as those of hydronephrosis.

In the majority of cases no tumor is felt, but a tumor is of frequent occurrence and may be enormous.

The diagnosis between this condition and hydronephrosis is seldom possible unless the symptoms are suggestive; in pyonephrosis fever may be present at times; there are more gastric symptoms, anæmia, increased arterial tension; the possibility of pus in the urine with the other characters of the urine pointing to chronic nephritis are of value.

Tumors which are sometimes mistaken for pyonephroses are cysts and malignant growths of kidney, distention of the gall-bladder, encysted peritoneal fluid, ovarian and pancreatic cysts.

In pyelitis and pyonephrosis the examination of the bladder with the cystoscope to rule out inflammation at that point, the possibility of catheterizing the ureters in women to see if pus be obtained, and the examination of the urine to determine if it has other than the features of cystitis may be of great help in the diagnosis; it must not be forgotten that cystitis is frequently the starting point of the infection, and its presence must often be expected.

## ABSCESS OF THE KIDNEY.

This condition differs from pyelitis and pyonephrosis in that the suppurative process begins in the cortex or pyramids of the organ; there may be one or more abscesses; the infection may be caused by wounds or blows over the kidney, by a calculus originating in a renal tubule; foreign bodies, as a bullet, piece of clothing becoming embedded in the kidney, from septic infarcts, or pyelitis.

The course may be acute or chronic; acute cases may have pain in the kidney region, diminution of urine at times; blood or pus is occasionally found in the urine; there may be fever and sweating and rigors; physical signs are usually negative; very occasionally an enlargement of the kidney is made out.

Chronic cases are difficult to make out; there may be pain in the side or loins, occasional rigors and fever, sweating, emaciation, and impairment of health. Pus may be found in the urine, and in course of time there may be signs and symptoms of chronic nephritis.

## RENAL CALCULUS.

When a stone passes from the pelvis of the kidney to the bladder the symptoms and signs are usually very characteristic.

Very small stones may pass without producing any symptoms; as a rule, very sharp pain of a tearing, cutting nature is referred to the situation of the ureter; the pain travels and radiates downward and may be felt in the testicle of that side; it may be felt toward the median line or even on the opposite side; there may be a chill, nausea and vomiting, with cold sweating; the urine

is voided at frequent intervals and may contain a little blood; the pain lasts from a few hours to two or three days; it ceases suddenly, but may recur from the passage of another stone, or from the same stone, which became engaged in the ureter and afterward worked back and again started toward the bladder. Examination may elicit tenderness over the kidney or course of the ureter; the testicle of the affected side may be drawn up; the evidences of severe pain are apparent.

Conditions which may simulate renal colic are not uncommon.

Biliary colic has many of the symptoms, but the pain is located differently; there are no urinary symptoms and jaundice may follow, yet there are cases which at first are puzzling.

Appendicitis may cause pain which is as sudden and as severe; there is, however, more tenderness, more localization. There are no urinary symptoms. Fever, which is usually present, is not of positive value, as in renal colic there may be a rise of temperature.

Twisting of an ovarian pedicle may give intense pain in the common situation, and in tense abdominal walls the tumors may not be felt; a vaginal examination should clear the matter up. There are no urinary symptoms.

Rupture of an extrauterine pregnancy may give intense pain in course of ureter, but there is more shock and, perhaps, evidence of hemorrhage; in both cases there may be frequent micturition, but there should be no blood in urine passed during ruptured gestation unless it comes from the uterus. Vaginal examination should clear the case.

Stones which lie in the pelvis of kidney and do not migrate often give no symptoms; as a rule pyelitis or pyonephrosis are set up.

Spasmodic, colicky pain may be caused by the stone engaging in the ureter or by its blocking the orifice, the distention of pelvis by urine causing the pain; after an attack of such pain there is usually pus or blood in the urine.

The history of the previous passage of a stone or of gravel, or the microscopic findings of much uric acid or oxalate of lime, are always of great value in the diagnosis of stone in the kidney.

Large stones are frequently found in the pelvis of the kidney, with branches which extend into the infundibuli or which invade and destroy the kidney substance. The long irritation of such

a stone usually results in pyelitis or the formation of chronic abscesses in the kidney. The opposite kidney is apt to be attacked with chronic diffuse nephritis.

## CYSTS OF THE KIDNEY.

Small serous cysts are often found in the cortex of the kidney in people who die after middle age; they produce no symptoms and cause no signs.

Cystic degeneration of the kidney is not infrequent; there are multiple dilatations of the tubules, with gradual destruction of the kidney tissue; both kidneys are usually affected. It is more common in adult life. Diagnosis is made almost entirely by the physical signs.

The skin is pale, the heart enlarged, aortic sound accentuated, and pulse increased in tension.

The urine is often increased in amount, contains a little albumin and a few casts. Palpation often gives a tumor characteristic of kidney enlargement on one or both sides; the tumor is elastic, does not fluctuate; its outline may be a little irregular.

The duration of the affection may be two to six years; death is usually from some intercurrent affection.

## HYDATID CYST OF KIDNEY.

The kidney is the third most frequent site of these tumors. In about one-third of the cases an abdominal tumor in the characteristic kidney region may be felt; it may be as large as a man's head. The diagnosis is made, not by the character of the tumor or of symptoms, but by finding vesicles or hooklets in the urine; this occurs in about 80 per cent. of the cases.

The duration of the symptoms and signs varies; many cases recover spontaneously; operations are usually successful.

## NEW-GROWTHS OF KIDNEY.

Benign growths are infrequent; adenomata, leukæmic growths, fibromata, syphilitic gummata are occasionally found, but do not give characteristic symptoms or signs.

Malignant growths are not infrequent. Sarcomata are by far

the most frequent: they occur more often in young children and infants, and in these subjects may sometimes be bilateral; in adults they occur late in life and are slower in growth than in children.

Carcinomata occur after middle life; they are usually of the encephaloid variety.

The diagnosis is made by discovering a tumor in the region of the kidney which grows rather rapidly; it is often tender, and spontaneous pain is very frequent; hæmaturia is frequent, and may be severe.

Emaciation and cachexia usually take place rather rapidly.

In children other tumors of the kidney are rare.

**Adrenal and Accessory Adrenal Tumors.**—These are very rare; very rarely there is a growth which contains much fat in a reticular structure; it increases to a large size; there may be metastatic growths. If a tumor is felt it cannot be recognized not to be from the kidney; most of the cases are fatal in a few years.

# CHAPTER XVI.

## DISEASES OF THE LYMPHATIC AND DUCTLESS GLANDS.

### MYXŒDEMA.

This is a disease produced by loss of function or by total removal of the thyroid gland.

Women are most frequently affected; in men it occurs in only 10 per cent. of the cases.

The diagnosis is very simple in well-marked cases, but in the early stages the condition is often mistaken for anæmia or Bright's disease.

The appearance of a well-marked case shows swelling of the whole body, although the face, over the clavicles, and the extremities have a more striking appearance; the face looks heavy, the eyelids are thickened and baggy, and the lips swollen; the color of the face is pallid except over the malar bones, where a pink flush is usually seen; the eyebrows are raised and arched like a Mongolian; the skin is dry and often scaly; the hair, especially of eyebrows and temporal regions of scalp, is much thinned, its lustre is lost, and it easily breaks. Moles frequently develop on the trunk. The mucous membrane of lips and of mouth is swollen and more translucent; the teeth degenerate and often fall out. Over the clavicle there is often a great deal of tumefaction.

The hands and feet are increased in size, and the hands have a spade-like appearance.

In early cases the swelling of skin is not uniform; certain parts may be affected before others.

Speech is usually much changed; it is monotonous, comes deliberately, is not clear or resonant. Some cases are very talkative; others are taciturn. Movements of hands and body are awkward; stumbling and falling are not infrequent.

Tactile sensations are slowly received. Mental action is also less acute.

The temperature of body is apt to be subnormal, often as low as 96°; there is great sensitiveness to cold.

Severe headaches are frequent; deafness is not uncommon. The urine is somewhat reduced in quantity; it contains no albumin or sugar. Urea is diminished. Slight cases can only be differentiated from anæmia and chronic Bright's disease by a careful examination into all the points which suggest myxœdema. The examination of urine is usually negative. The blood shows a moderate degree of anæmia, but has no characteristics of the blood of a profound or pernicious anæmia.

**Sporadic Cretinism (Myxœdema of Childhood).**—This condition is due to congenital absence of the thyroid gland or want of its proper function.

It is seldom seen before the second year; it seriously interferes with physical and mental development. The head is good sized and heavy; it tends to fall on the chest; the shoulders are rounded and the spine curves forward in the lumbar region, producing much prominence of the abdomen; the legs are bowed and the hands and feet are large; the whole trunk is stunted. The features are heavy; the eyebrows are arched; the eyes are partially closed by puffy, thickened lids; the nose is heavy and broad; the lips are thickened; the tongue large, often protruding between the teeth; there is salivation and drooling.

The skin is pale, dry, and thickened; the hair is thinned, brittle, and lustreless.

Over the clavicles and in the suprasternal notch deposits of fat, almost like tumefactions, are seen.

The belly is prominent and may have large folds of fat on it.

The legs are bowed; hands and feet are large and thick.

All movements are awkward and slow. Mental action is very dull. The temper is usually good, but some of the cases are irritable. Speech comes with great difficulty, and is labored and slow.

Temperature is subnormal; there is great sensitiveness to cold.

The urine is passed in large quantities; it is of low specific gravity; it contains no albumin.

The habits are dirty; the child may be over ten years of age before it can feed itself or tend to its functions; if cases reach adult life they are much stunted.

## EXOPHTHALMIC GOITRE (GRAVES' DISEASE, BASEDOW'S DISEASE).

This disease is rare in children and old people; it is most common between sixteen and forty. Women are affected in about 90 per cent. of all cases; this may vary in different countries. The disease often occurs in families, and there is a tendency to heredity.

The distinguishing features are very marked and obvious.

The heart is much increased in rate, often in force; it ranges in different cases between 90 and 150; the heart is increased in size; sometimes there is a systolic murmur over the apex or pulmonary area; the vessels of the neck pulsate; there may be a thrill and roaring hum over the thyroid vessels.

The thyroid gland is almost always uniformly enlarged to a moderate degree; it is soft and about of normal consistence; it may not be symmetrical; the right side is more often larger; the isthmus may be nodular; sometimes the gland is quite hard. The gland may not be enlarged.

The eyes are usually prominent and staring; the upper lid may not follow the eyeball closely on looking down; this is called von Gräfe's sign; Stellwag's sign is the increase in the palpebral fissure. A lack of convergence of the eyes for near objects is often seen. Sudden dilatation of pupils on near convergence is sometimes seen.

A slight ptosis of one or both upper lids is occasionally seen.

Exophthalmos is sometimes absent. Tremor, especially of the hands, is almost always seen; it is fine and occupies about $\frac{1}{10}$ of a second; it is increased by excitement and attention; it may communicate itself to the whole arm and body.

Emaciation is often very marked in acute cases; in some cases nutrition is good.

Loss of strength is usual. Sensation of heat is often annoying; there is apt to be flushing of head and neck while the patient is being observed. Sweating, especially of hands and feet, is very frequent. The skin often suffers from increase in pigment; the skin of the face, especially, may become bronzed or there may be irregular patches of pigmentation on different parts of the body.

The hair may become thinner; it loses its lustre.

The teeth often become carious. The respiratory system is

often affected; there may be a nervous cough; attacks of dyspnœa sometimes occur; chronic bronchitis and interstitial pneumonia are occasionally found.

Œdema of lower extremities or effusion into the serous cavities are sometimes seen.

The digestion is apt to be disturbed; the appetite is capricious; there may be abnormal longings.

Looseness of the bowels is a very common symptom; there are four or five loose movements every day, or sharp attacks of diarrhœa may occur.

Vomiting is sometimes very obstinate, and may be a grave symptom. Irregularity of menstruation is frequent.

A change in the mental condition is often noticed; irritability and inability to keep quiet or to do one thing is common; melancholia may be present.

The diagnosis is not difficult, except in the beginning, when the thyroid enlargement is moderate and the heart's action not very frequent. It is common enough to find young women with slight enlargement of the thyroid and overaction of the heart from nervousness. These cases may have to be watched some time before a sure diagnosis can be made. The best sign against the disease is a normal heart action, which can usually be determined at some time when the patient is quiet and free from excitement.

Death in this disease may be caused by a very severe toxæmia, with high fever and marked cerebral symptoms, which may last a week or longer. Autopsy reveals nothing, although in some cases, besides thyroid enlargement, much enlarged thymus with great softening is present.

## ADDISON'S DISEASE.

This malady is, in the majority of cases, due to a tuberculous inflammation of the adrenals; other inflammations and new-growths are occasionally the cause.

The physical signs are very striking. Pigmentation, which looks like sunburn, gradually appears in the skin; the places most affected are the exposed parts, as face, neck, back of hands, but it may be very marked around the nipple and in all the flexures; the mucous membranes of mouth and vagina are sometimes very dark.

There is emaciation and muscular feebleness; the latter is very

marked. The heart's action and pulse are very feeble; the temperature is usually subnormal; the extremities may be cold.

Vomiting is frequent in the later stages of the disease; anorexia is very marked.

The patient appears very lethargic. The duration of the disease is usually within two years; it may be very short and in some cases of much longer duration; it progresses with exacerbation, followed by remissions.

The pigmentation may be misleading, as there are many conditions which have this symptom; among the most common are: tuberculosis of the peritoneum and sometimes of lungs, cirrhosis of the liver, exophthalmic goitre, malarial melanæmia, rheumatoid arthritis, exposure, and lack of cleanliness.

## HODGKIN'S DISEASE.

This affection is characterized by enlargement of groups of lymphatic glands, by anæmia of varying degree, and very frequently by enlargement of the spleen.

The male sex is more frequently affected than the female.

It occurs at all ages, except in young infants and very old people.

The duration does not average longer than two years, but there are cases more acute and others much more chronic.

Physical examination is most important in making the diagnosis. The cervical glands are most frequently affected; the glands are very numerous, at first easily separated, but in time inseparable masses swell the neck to enormous proportions; the axillary and inguinal glands are usually affected in the same way, appearing after the cervical enlargement, although occasionally before; the growth may become stationary, but usually increases until death takes place, which may be from pressure.

The thoracic and intra-abdominal glands are very often affected; in the former case pressure in the bronchi may cause death from dyspnœa; the superior vena cava may be almost completely obstructed by pressure; there is great enlargement of the jugular veins and veins of the head in these cases. Intra-abdominal pressure may partially obstruct the inferior vena cava and iliac veins, causing œdema of the lower extremities; pressure on the solar plexus may cause bronzing of the skin.

The spleen is often enlarged, but rarely before the glands; its increase in size is never very great.

Anæmia is often profound, especially in the severe and fatal cases; it usually occurs early; hemorrhages may occur from the nose or into the mucous membranes or retina. The blood contains a diminished number of red blood cells; there may be some increase in the microcytes.

FIG. 8

Hodgkin's disease. Glands in right axilla and neck much enlarged. (Musser.)

The white cells are either normal or somewhat increased; in some cases the eosinophiles are more numerous than normal. It is impossible to make a diagnosis from the blood alone.

The heart is often weak and frequent; compression of the vagus nerve may cause irregularity.

Dyspnœa is a frequent symptom; it is due to pressure on the trachea and bronchi, on the veins, or from anæmia.

Temperature is apt to be somewhat above normal.

The diagnosis is easy in advanced cases with groups of glands enlarged and the spleen involved. In early cases it has to be distinguished from simple adenitis, tuberculous adenitis, syphilitic adenitis, and sarcoma.

Acute adenitis is frequent in the neck; the enlargement takes place rapidly; the glands are quite tender and usually suppurate.

Tuberculous adenitis almost always begins in the neck and does not affect other glands for a long time; they become matted together early and break down after some time; this condition in some cases is very difficult to distinguish from Hodgkin's disease.

Sarcoma arising in the lymphatic glands is rare, but it may occur; the glands are harder and spread contiguously to other glands, with less liability of affecting distant groups; the spleen is rarely enlarged.

Leukæmia may have the appearance and physical signs of Hodgkin's disease, but examination of the blood easily distinguishes between them. In most cases of leukæmia the spleen is the important feature and the glands of secondary importance; in some cases the enlargement of the glands and spleen occur simultaneously, and because the course of the disease is more like Hodgkin's disease it is believed that the two are combined, being really a case of Hodgkin's disease with leukæmia.

Syphilitic enlargement of glands seldom resembles Hodgkin's disease; in the secondary stage the glands are too small and too universal, and the seat of infection is usually apparent. In the tertiary stage enlargement can usually be traced to a skin or mucous membrane lesion; occasionally there is a large glandular swelling due to gummata of the glands; in these cases there are many glands involved in a group; other groups do not become affected; evidence of inflammation soon occurs.

# CHAPTER XVII.

## DISEASES OF THE BLOOD.

### ANÆMIA.

**Chlorosis, or Simple Anæmia.**—This affection occurs almost exclusively in young women; it is due to a great diminution in the amount of hæmoglobin and to a lesser degree of red blood corpuscles.

The diagnosis can almost always be made by physical examination. The color is usually the most striking feature; there is pallor of the skin and mucous membranes, but this may be deceptive; a thick, brown or tanned skin may hide its color and may not show either anæmia or good color, but it is not the thickness of the skin in most cases which makes the color unreliable, but the condition of the capillaries and action of the heart; it is a common thing in health, with blood containing the same percentage of hæmoglobin, to find one person looking pale and the other florid, and while this may be partly due to the thickness of the skin, the chief factor is the degree of dilatation of the capillaries and the frequency of the heart; the same is true in anæmia. The color of the mucous membranes, especially of the tongue and gums, is a much safer guide to the amount of hæmoglobin.

The eyes, besides showing the pallor of the sclera, frequently show dilatation of the pupils, owing to relaxed muscular tone.

The tongue is pale and often broad, with edges indented; there may be tremor.

The heart is usually more frequent in action; the left ventricle may be very slightly enlarged; the right is almost always somewhat dilated and hypertrophied, more particularly the conus arteriosus, as is shown by dulness in the third space to the left of the sternum.

Heart murmurs are frequent and interesting phenomena; they are always systolic and blowing, sometimes musical; their intensity varies, often being very loud indeed. The most

frequent situation is over the pulmonary area, about 60 per cent. being heard in that region; the next most frequent point is at the apex, usually localized, but sometimes heard almost to the axilla; as a rule, when the murmur is heard at the apex it is heard also over the pulmonary area, but they may be heard at the apex alone; murmurs over the base may sometimes be heard over the aortic area, but quite infrequently over the aortic area only; these murmurs are almost always intensified at the moment of lying down and by exercise. The second pulmonary sound is often accentuated, and less frequently the aortic.

Venous murmurs in the neck of a humming quality are frequent; they are heard better on the right side. The pulse is frequent and unstable; its volume is good; it is usually soft, but at times a little increased in tension.

The feet are often a little swollen, especially at night; the legs may pit in bad cases.

The urine is generally increased in quantity and paler and lower in specific gravity.

Tenderness over the stomach is not infrequent; there may be vomiting of small amounts of blood.

Amenorrhœa is frequent, although sometimes there is menorrhagia. Leucorrhœa is not infrequent.

The diagnosis of chlorosis is usually an easy matter, but certain cases of secondary anæmia may give the symptoms and signs of chlorosis.

Ulcer of the stomach in young women is, perhaps, the most difficult condition to determine in some cases, as they resemble chlorosis very strikingly; in both cases there may be vomiting of small amounts of blood and gastric pain; an excess of hydrochloric acid and a localized point of tenderness may be the only signs which point to ulcer, but these may be absent, and if present are not positive.

Chronic lead poisoning is rare in women, yet it can occur, and might be very confusing. In young men, history and examination of gums clear the diagnosis more readily.

Anæmia of malarial cachexia shows enlarged spleen and, perhaps, the protozoa in blood.

Anæmia from worms, particularly the ankylostoma duodenale, is rather rare, but may occur.

Anæmia of syphilis is frequent in men and occasionally in young women. Chronic arsenic poisoning is a rare cause.

Subacute Bright's disease, while easily differentiated, has often been mistaken for chlorosis.

**Pernicious Anæmia.**—Pernicious anæmia is a severe, almost always fatal form of anæmia which occurs almost exclusively in adults past middle life, but it may occur at any age. Men are more often affected than women.

The changes of the blood are pretty uniform, although in many cases the changes are such as are seen in any severe secondary anæmia. There is great diminution in the number of red blood cells, often falling below one million to the cubic millimetre and sometimes even lower; the hæmoglobin in each cell is up to the normal standard; the white blood cells are normal; there may be much change in shape of the red cells (poikilocytosis), large red cells (megalocytes), small red cells (microcytes), nucleated red cells—medium, large, or small (normoblasts, megaloblasts, and microblasts).

In some cases the red cells are normal in appearance, simply being diminished in number.

The appearance of the patient always shows great pallor of skin and mucous membranes; there may be difficulty in getting a drop of blood from the finger.

The heart sounds are feeble; a systolic murmur at apex and over pulmonary area is generally found; a venous hum is frequent; the pulse is full and soft, greatly increased in rate by exertion; the carotids often show very marked pulsation.

The temperature is often above normal and it is rather irregular; it is usually higher in the evening; the fever may have distinct exacerbations and remissions. Small hemorrhages into skin and mucous membranes are not infrequent; they are frequently seen in the retina; they may occur in brain and spinal cord, but are not severe.

Dyspnœa on exertion is regularly found. Œdema of feet is seen in the late stages.

The urine is of normal quantity; it may contain urobilin, casts with blood pigment, and increase in the amount of iron.

Diagnosis between pernicious anæmia and a cancer, of liver for instance, without symptoms or signs may be almost impossible

Severe anæmia from chronic lead poisoning, syphilis, worms, gastric ulcer, and chronic gastritis may suggest pernicious anæmia, but the degree of anæmia is seldom as marked; blood

changes are more characteristic in pernicious anæmia, and from a study of the history of these cases very little doubt is likely to be entertained as to their real nature.

**Splenic Anæmia.**—This is a rare affection characterized by a profound fatal anæmia accompanied by enlargement of the spleen.

It is more frequent in men and occurs most often in the first half of adult life, but may occur at all ages.

The early signs show simply a profound anæmia; the blood shows simply diminution in red cells; there may be frequent epistaxis. There is no emaciation, but much muscular weakness; the heart is frequent and hæmic murmurs are usually present.

The spleen increases in size after the disease is well established; during its enlargement it is very painful and tender, muscular weakness progresses, and there may be hemorrhages in the skin or mucous membranes.

There is a rise of temperature of the hectic type, which may reach 102° in the evening.

Toward the end the patient becomes dreadfully weak and passes into a semicomatose state.

The disease progresses continuously and is seldom of longer duration than two years.

## LEUKÆMIA, OR LEUKOCYTHÆMIA.

This disease is regularly accompanied by enlargement of the spleen; there may or may not be enlargement of groups of lymphatic glands. The changes in the blood are a great increase in the number of white corpuscles and diminution of the red cells.

The disease may differ somewhat in its types, not necessarily clinically, but as judged from the appearance of the blood it has been found that in one type the white cells are much increased in size; they are finely granular or contain coarse, highly refracting granules. The different forms are large uninucleated white cells, eosinophile corpuscles, multinucleated leukocytes, "mast-cell" leukocytes; occasionally nucleated red cells are found. This variety is called the "splenomedullary" form.

In the second type, which is called the "lymphatic" form, the feature is a great increase in the uninucleated leukocytes (lymphocytes); multinucleated cells and eosinophiles are not increased.

In all forms of leukocythæmia the red cells are diminished in number; sometimes there may be no more than 1,000,000 to the cubic millimetre; there may be poikilocytosis and large red cells.

The number of leukocytes may be from 100,000 to 1,000,000 to the cubic millimetre.

The affection may occur at any age, but it is more common in adults; men are affected twice as often as women; in men it usually occurs at an earlier age than in women.

The duration varies; it may run an acute or chronic course; in the first instance it may end fatally within a year; in chronic cases the duration may be several years.

The diagnosis is seldom difficult; the anæmia, great enlargement of spleen and lymphatic glands are suggestive enough, but the examination of the blood is always necessary to make a positive diagnosis.

The spleen is always enlarged and often enormously so; its shape is well preserved and its notch can usually be felt; its surface is sometimes a little irregular; its consistence is firm.

The liver is usually enlarged, the edge being felt one or two inches below the free border of the ribs.

The lymphatic glands are enlarged in about one-third of the cases; they are seldom larger than a small plum; the cervical, axillary, and inguinal are the groups mostly affected; the glands do not mat together.

The lymphatic tissue of throat is usually hypertrophied.

Hemorrhages are very frequent; at first they are from the nose, but later from the stomach or bowels; rarely from the lungs; in the later stages cerebral hemorrhage may be fatal; hemorrhages into the skin, perinephritic region, and pleural cavity are sometimes seen.

A rise of temperature is frequent, especially at night; there may be profuse night-sweats.

The heart shows characteristic changes of severe anæmia.

The splenomedullary form is usually chronic and is not accompanied by enlarged lymphatic glands, as a general rule.

Acute cases and those in which the lymph glands are enlarged are generally of the lymphatic type. If the blood is examined the diagnosis is easy, but in early cases the increase in white cells may be confounded with leukocytosis, but the different character of the cells is, as a rule, quite enough to differentiate by.

## PURPURA.

The occurrence of spontaneous hemorrhage into the skin, mucous membranes, internal organs, and tissues is designated by the general term purpura. There are many varieties, classified according to the cause or course of the affection.

The immediate cause of the extravasation of blood in purpura is not thoroughly understood; that there are many toxic, mechanical, and chemical conditions which accompany this phenomenon is well recognized, but just what part micro-organisms, toxins, change in the composition of the blood and bloodvessels may play is still unknown.

The classification of purpura, according to the pathological condition under which it occurs, is as follows:

(*a*) Infectious diseases, such as smallpox, scarlet fever, etc.

(*b*) Rheumatism.

(*c*) Certain chemical or organic substances in the blood, as phosphorus, bile, and urinary constituents, etc.

(*d*) Absence of some necessary constituent in the blood, as in scurvy.

(*e*) Changes in the blood cells, as anæmia, leukocythæmia, etc.

There are other causes which are due to the conditions of bloodvessels, as overstrain from increased blood pressure seen in heart disease, convulsions, whooping-cough, or congenital imperfections, as in hæmophilia, but these cannot be properly classed as purpura.

There are other forms of purpura which have an unknown cause, although the course of the affection is such that they can be classified; these forms of purpura are often most puzzling, and much confusion still exists in their diagnosis; they assume on this account, and because of their severity in some of the classes, a place of considerable clinical importance. The most important of these have been classified as follows: (1) purpura simplex; (2) purpura rheumatica; (3) purpura hæmorrhagica; (4) Henoch's purpura.

**Purpura Simplex.**—In these cases cutaneous hemorrhages or extravasations appear suddenly in subjects whose health seems good; it occurs most frequently in young people.

The spots usually appear first on the lower extremities; they come out in crops which may extend pretty generally all over

the body, or the distribution may be irregular. The spots vary from petechiæ to the size of a half-dollar.

There may be malaise and slight fever at the onset; the duration is from a few days to two weeks. The spots at first are bright, then become dark and purplish, then greenish and yellow; brown stains may persist for some time after the attack has passed.

**Purpura Rheumatica.**—That this affection has any relationship to true inflammatory rheumatism is extremely doubtful; that arthritic symptoms are generally present and sometimes prominent cannot be denied; occasionally inflammation of the joints precede the appearance of the spots, and inflammation of the joints may follow an attack, but such inflammations may not be rheumatic. We know absolutely that the course of the inflammation of the joints during an attack of purpura does not resemble the course of an attack of inflammatory rheumatism. It would be better to call the disease arthritic purpura, but the usual title is better understood when referring to this type of purpura.

The occurrence is in young adults, of about the same frequency in the sexes. The onset is sudden, usually occurring in the afternoon or evening. A heavy, bursting or burning sensation is felt in the lower extremities; coincident with this is the appearance of extravasations of blood in the skin; the spots vary in size from a pinpoint to a ten-cent piece; the ankle and knee joints may become tender, swollen, and painful; occasionally the wrists and elbows are painful; the legs may be tender and painful everywhere, with some œdema of the feet and legs. The symptoms usually subside quickly and the spots turn purple, green, and yellow, but usually about the third day in the evening the attack is repeated, more pain, more joint symptoms, and more spots; such remissions and exacerbations, with a tendency for the spots to spread higher to the thighs, or even to the buttocks, may be a feature; the skin above and below the elbow may be affected. Fever of moderate degree occurs in a fair proportion of the cases; sweating is not usually marked. There are not many constitutional symptoms; the patients may be able to walk about, but this may be very painful; exertion seems to bring on an attack. The disease lasts an indefinite time; it usually clears up in a few weeks, but may continue for weeks; recovery almost invariably takes place.

**Purpura Hæmorrhagica.**—This name is used to designate a form of purpura in which, besides the cutaneous extravasations, there may be, and usually are, subcutaneous hemorrhages and hemorrhages under the mucous membranes or from the mucous surfaces.

The onset is usually sudden, with headache, malaise, and vomiting, followed by the appearance of hemorrhages into the skin and from the mucous membranes, in the soft areolar tissue, as orbits, scrotum, and penis; the swelling may be very great, hemorrhages may occur into the tongue and cause great swelling; bleeding from the mucous surfaces may be very severe; epistaxis is most common, but there may be hemorrhages from the mouth, lungs, stomach, or intestines.

The red cells diminish very rapidly in number when there are severe hemorrhages. Fever is present in most of the cases; it may be quite high; there may be hyperpyrexia; pains in the extremities are frequent.

Many cases are fatal, the duration may be a few days, but more often covers weeks and months; relapses are very frequent.

**Henoch's Purpura.**—This affection is characterized by the occurrence of sharp pains in the extremities, swelling and pain in joints, very severe colic in the abdomen, followed by vomiting, sometimes bloody, and the appearance of purpura on the extremities; gastrointestinal symptoms may usher in the attack. Such an attack may last a week or two and is followed by repeated attacks, sometimes after the interval of months.

Nephritis may be a complication. The hemorrhages are chiefly in the extremities, but the mucous membranes are occasionally affected.

Perforation of the stomach has occurred after gastric hemorrhage.

## SCURVY.

This affection is seldom seen at the present period. It is always due to the absence of fresh vegetable food. Lemon-juice or lime-juice is almost a specific preventive.

Weakness and mental sluggishness usually precede the physical signs; the skin becomes rough, small petechial hemorrhages occur in the skin of lower extremities, there may be livid patches resembling bruises, the eyelids are swollen, and there may

be ecchymoses on the conjunctiva; tender, subcutaneous swelling may be found on the soft parts of legs and around ankle.

The gums are often affected as an early symptom; they become swollen; afterward red, soft, pulpy swellings appear in front and behind the dental arches; these bleed very easily; as the disease progresses there is great dyspnœa on exertion and extreme lethargy, severe muscular pains in legs and back, and the gums swell enormously and often ulcerate deeply and expose the bone; on the bone a subperiosteal node may form; there may be effusion of serum into the pleural or pericardial sac or into a large joint; ulcerations of the skin may take place which have a bloody, livid base and bleed freely; diarrhœa may set in. The disease is seldom fatal; very extreme cases recover under proper care.

**Infantile Scurvy.**—This affection in one sense is more important than the former, as it is not of very rare occurrence in large cities.

It occurs between the ages of six and eighteen months, and is always caused by want of antiscorbutic elements in the food.

The child has rickety tendencies which, as a rule, are not very pronounced; it is fretful and perspires a great deal; when the disease is established it cries at the slightest touch; the legs are pulled up and rotated outward and kept very still, as if paralyzed; on examining the legs the periosteum of one or both tibiæ seems thicker and is very tender; in some cases this is not well marked; deep-seated hemorrhages may occur in the muscles of the leg, which produces a tender swelling often mistaken for abscess; the arms are seldom much affected; there may be swellings over radius and humerus; swellings have been, in a few cases, observed on skull, ribs, and scapula.

Sometimes there is separation of the epiphyses of the long bones or fracture of the shaft.

The complexion becomes very pale and sallow; the heart is weak; there may be a hæmic murmur.

The gums become swollen and spongy; their color is purple or red; there may be hemorrhage from them; ulcerations may take place and then the odor of the breath is fetid and putrid; the teeth become loose and may fall out. There may be hemorrhage about the eye or scrotum.

Hemorrhage over the upper lid may cause ptosis of the lid,

The disease steadily gets worse unless the food is changed; the child becomes weaker and extremely emaciated and cachectic: it may die from exhaustion or from sudden hemorrhage of one of the internal organs.

If the disease is properly treated recovery takes place in a few weeks.

# CHAPTER XVIII.

## DISEASES OF THE JOINTS.

### RHEUMATISM.

Rheumatism is an affection characterized by inflammation of synovial membranes of joints and the soft parts around them; the endocardium and pericardium and heart muscle are often affected, and occasionally the pleura is inflamed. Its course is very variable; there is a proneness to relapse and there seems to be a hereditary tendency which predisposes some to the disease. While the cause of the trouble is unknown, the malady is best appreciated by regarding it as a specific inflammation due to an unknown micro-organism.

The course is acute or subacute.

**Acute Articular Rheumatism.**—The joints show very characteristic evidence of the disease; there is much swelling, redness, and tenderness; the skin is often glazed; there is no fluctuation or appearance of much fluid in the joint; the position assumed is one of semiflexion, which relaxes the muscles about the joint.

There is always more than one joint affected; the knees and ankles are more prone than others, then the wrists and small joints of extremities and the elbows; hips and shoulders are less often the seat of the inflammation.

One marked feature is its flitting tendency; letting up in one joint and attacking another is often seen; the inflammation may return to the joint in which the inflammation had subsided; the signs go on in this way in most cases for five or six weeks, but a longer or shorter duration is often observed.

In some cases swelling and marked inflammation of the joints are not features; there may be much tenderness and inability to move the limbs, accompanied by fever and other symptoms.

Endocarditis occurs in about 60 per cent. of the cases; the mitral valve is most frequently affected; endocarditis often occurs without any apparent increase in the symptoms; frequently, however, the heart's action is increased and the tem-

perature rises; in severe cases there is dyspnœa and cardiac distress.

Pericarditis occurs in a comparatively small percentage of cases; its onset is almost always marked by præcordial pain and increased heart action; if there is effusion, dyspnœa and distress may be very severe.

Pleurisy is not uncommon; when it occurs it gives its local signs and adds to the severity of the disease, but it generally clears up rather quickly.

Fever is irregular in its course; it usually corresponds to the severity of the arthritic inflammation; in some cases fever may be marked, with very moderate inflammation of the joints. Hyperpyrexia occurs in exceptional cases; it is very intense, and such cases usually end fatally.

Sweating usually accompanies the disease to a much greater degree than the fever itself would be responsible for; the skin, whether there is fever or not, almost always feels cool and moist; a sour odor emanating from the patient is usually perceptible.

The urine is always diminished in quantity, of very high color, and may contain a trace of albumin; the color is due to hæmatoporphyrin and to a small amount of urobilin; on cooling there is a pinkish precipitate owing to uric acid and amorphous urates. The duration is from three to six weeks, with tendency to relapse.

**Acute Rheumatism of Childhood.**—In children rheumatism, as a rule, presents a very different picture from that already described.

It is rarely as acute; it is more insidious in its onset and may easily be overlooked.

Arthritis may not be a special feature, although a close examination may discover slight tenderness or pain in the joints; a more marked sign is pain and tenderness of the hamstring tendons about the knee; these may be somewhat contracted and the child has a tendency to walk on its toes.

Endocarditis is much more frequent than it is in adults; it may come on without any symptoms to attract one, and thus may escape observation until at some future date a heart lesion is discovered; quite frequently there is fever and increased heart action; this, too, might be overlooked and considered of gastro-intestinal origin. In some cases endocarditis is very severe; the whole heart seems affected; pericarditis in these bad cases

occurs too; there may be high fever, dyspnœa, and great cardiac distress; such cases may end fatally.

Pericarditis is not infrequent.

Subcutaneous tendinous nodes are very important clinical phenomena often associated with the rheumatism of childhood; they are found near fascia and tendons, on the arms, back of trunk and head, on the legs; they vary in size from a small pea to a lima bean.

Tonsillitis may accompany or precede the rheumatism of childhood. Chorea seems to bear an intimate relationship at times to the rheumatism of childhood. It may precede, accompany, or follow an attack of rheumatism; endocarditis often goes with chorea.

There appears to be a marked inherited tendency to rheumatism in the children of rheumatic parents.

Rheumatism in children is liable to relapse; when once implanted it seems to play a part in childhood life which is both persistent and disguised in its manifestations; it may go on for years, attacking the child in the form of "growing pains," tonsillitis, subcutaneous nodes, endocarditis, pericarditis, and chorea. It never seems to play a frank part, and unless recognized and treated accordingly it has the power of working great injury to a developing child.

**Subacute Rheumatism.**—In this affection there is little fever; the joints affected are not so numerous; the inflammation is not so migratory as in the acute form; there is no definite course.

The joints are swollen and tender; there may be some redness; the wrist, ankle, and knee are most commonly involved.

Endocarditis and pericarditis is not nearly as frequent as in the acute form.

If taken early the symptoms may clear up in ten days or two weeks, but there is a tendency to relapse.

**Chronic Rheumatism.**—This title has, in the past, covered a multitude of conditions as well as sins; but while to-day it seems easy enough to eliminate such arthritic affections as those of gout, syphilis, arthritis deformans, etc., yet in the absence of the knowledge of the specific cause of acute articular rheumatism it would be impossible to absolutely deny the relationship to it of some chronic processes, although we may suspect them as being more of a sequel or an intercurrent affection.

Among these are: repeated attacks of pain with slight swelling and tenderness in the joints of those who have suffered from inflammatory rheumatism; these attacks are slight, and while they often occur in the joints, the muscles are subject to similar attacks; these cases are regularly helped by salicylates.

Cases which resemble these, occurring in elderly people who are ill fed and much exposed to the weather, are very doubtfully rheumatic.

In children we often find constantly recurring mild attacks of rheumatic manifestations extending over years; these attacks of "growing pains," tonsillitis, chorea, subcutaneous nodes, erythema marginatum, endocarditis, and pericarditis seem truly rheumatic.

Sequels of acute articular rheumatism are not infrequent; pain and stiffness of one or more joints may continue for months and occasionally are permanent.

Occasionally a single joint does not recover and a chronic synovitis is set up, and ultimately the joint becomes fixed in fibrous ankylosis. The finger-joints may become fusiformly enlarged, simply due to thickening of the joint capsule and not to thickening of cartilage or bone; these cases resemble rheumatoid arthritis.

**Muscular Rheumatism.**—The name is misleading, as this affection probably has no relationship in its etiology with inflammatory rheumatism, although those who have had rheumatism seem more liable to this trouble than those who have not. Gout predisposes one to this affection more often than true rheumatism, but muscular strain and exposure to bad weather or draughts seem to be more potent factors in producing it.

The muscles most liable are the lumbar, intercostal, deltoid, and cervical.

Pain is the most severe symptom, but usually there is no pain except on motion; yet it can be agonizing in some cases, even in paroxysms, without motion. Stiffness is a constant feature; sometimes there is very little pain, but function is lost on account of stiffness.

Spasm or contraction of a muscle or group is common in children; with the sternocleidomastoid and trapezius affected, there may be marked torticollis; spasm to some extent is often seen in the lumbar muscle in adults.

Swelling of the muscles may take place.

Tenderness is seldom very marked. Cases run an acute and chronic course.

**Gonorrhœal Rheumatism.**—This affection is due to the entrance of the gonococcus into the blood; the joint manifestations are the most important, although iritis is not uncommon, while sciatica, pericarditis, and endocarditis have been seen.

The infection is almost always due to gonorrhœal urethritis, but cases secondary to gonorrhœal conjunctivitis have occurred.

The joint symptoms manifest themselves most frequently between the second and fourth week of a gonorrhœa; they can occur earlier, but more frequently later than earlier; sometimes the infection takes place from an old gleet.

Men are much more frequently affected than women.

The inflammation is frequently monarticular or confined to a few joints, but it may affect almost every joint in the body.

The temporomaxillary articulation may be affected, an occurrence seldom seen in true rheumatism.

The fascia around the heels and plantar region is very often inflamed, resulting in much stiffness of feet and flat-foot. Cases run an acute, subacute, or chronic course.

Acute cases usually begin in the knee-joint; swelling takes place rather rapidly; effusion can, as a rule, be made out; the soft parts are involved to some extent, but there is seldom much redness of the skin; the inflammation may begin in the fascia of the feet, the soft parts around being much swollen, or a number of joints may become affected simultaneously; there is no migratory tendency; in exceptional cases the inflammation becomes purulent; pain and tenderness are seldom as severe as in inflammatory rheumatism.

In some cases there are swellings over the tendons on the back of hand or instep from inflammation of the tendon sheaths.

The acute symptoms usually subside in a few weeks and become chronic; in some cases cure takes place quickly.

Chronic gonorrhœal rheumatism usually follows the acute form, but the symptoms and disability may come on gradually; in most of these cases the feet are chiefly affected; there is thickening of the metatarsophalangeal joints with stiffness; there is bulging of the soft parts inside the instep and inner malleolus; the knees, wrists, and elbows may be swollen and stiff; these conditions with exacerbations of pain, stiffness,

and swelling last for months and perhaps years; as a rule, recovery is fairly complete; there may be left some thickening of joints or flat-foot.

In some cases chronic inflammation continues; the joints become disorganized and deformed and resemble the joints of rheumatoid arthritis; in these cases it is not known whether the affection is simply gonorrhœal or whether it is a true rheumatoid arthritis engrafted on old gonorrhœal joints.

Complications of gonorrhœal rheumatism are not numerous and seldom occur.

Iritis is perhaps the most frequent.

Endocarditis is a rare affection; the left side of the heart is almost never affected, but occasionally inflammation occurs on the pulmonary valves; these may be roughened, stenosed, or rendered insufficient. The lungs are sometimes affected by infective emboli which come from the pulmonary valves; these give the evidences of pulmonary infarctions which, as a rule, clear up, although suppuration and septicæmia are occasional consequences.

**Arthritis Deformans.**—This affection produces hypertrophy of the articular ends of bones, of the cartilages covering them, and of the synovial membrane; occasionally there is fluid in the joint. The joint surfaces become irregular; the synovial membrane and cartilages in places may be destroyed.

The principal joints affected are those of the extremities, especially the smaller articulations, although in bad cases the deformities are greater in the large joints; the disease in some cases is almost universal; even the vertebral column may share in the articular changes. The back may become rigid; the temporomaxillary articulation is frequently affected and the jaw may be opened only with difficulty, and in bad cases not at all.

The muscles in connection with the joints atrophy from disuse; this atrophy exaggerates the deformity and enlargement of the joint very markedly.

**Heberden's nodes** are osteophytic growths of bone usually near the joint, but on the shaft these may precede the joint signs or occur afterward; their favorite situation is on the first phalanx or near the elbow.

Brown pigmentation on the skin, especially on the forehead, cheek, or back of hands, are often striking; the skin is pale in other places.

Anæmia varies in degree, but is never very serious.

The disease occurs at all ages, but the early half of adult life is the period in which it occurs most frequently; men are affected somewhat more often than women.

The course is, as a rule, very chronic, extending over many years, the patients dying from an intercurrent affection; some

FIG. 9

Rheumatoid arthritis. The tapering fingers are seen. The phalangeal joints are swollen; many are ankylosed. The wrist is stiff. The muscles are atrophied; the forearm muscles much wasted. (Musser.)

cases are more acute, and the disease may even be the cause of death.

**The diagnosis** in established cases is not difficult.

The joints have a striking appearance; their range of motion is restricted; they are enlarged, oftentimes irregularly; the ends of the bones seem swollen, as a rule not uniformly, but one side is apt to be more prominent than the other and the extremity is deflected from the regular direction; there is seldom any redness excepting during an exacerbation of the inflammation;

there is moderate tenderness on pressure; in occasional cases fluid may be found in one or more joints, in the knee most commonly. Ankylosis of the joints may occur.

The general health is usually fair; nutrition may suffer to some extent; in bad cases there may be exhaustion. The heart is never affected unless as an intercurrent affair. The pulse is usually rapid, 100 to 120.

Loss of joint function may be marked or complete in bad cases.

In considering the diagnosis there are very few conditions which in any marked way at all resemble this disease, and yet one almost always discovers that the sufferers have been treated for almost every chronic affection of the joints.

Rheumatism, except for being an affection of joints, bears no other resemblance; there is no change in the articular ends of bones; there is always marked evidence of rather acute inflammation.

Gout, which is very chronic and has marked deposits of sodium urate about the articulations, may produce changes which in appearance look like those of rheumatoid arthritis; the subjects are usually quite advanced in years; the smaller joints, especially of hands, are almost exclusively affected; there is no universal tendency; the history of acute gout is almost always discovered. Changes in the heart, arteries, and kidneys, secondary to gout, are usually found.

Gonorrhœal rheumatism in acute cases bears no resemblance, but in old chronic cases, where many joints are affected with swelling, restricted motion, and deformities, the similarity may be marked and the diagnosis very difficult; the history of an acute onset during an attack of gonorrhœa, of more marked inflammatory exacerbations, and the greater tendency to affect the knee or feet with fewer changes in the bones themselves, point to gonorrhœal arthritis.

**Syphilitic arthritis** may enlarge the articular ends of bones, produce swelling and deformity, but the affection is not universal; the smaller joints of extremities are not so often affected as the knee, elbow, or ankle; there is greater pain and tenderness in syphilis.

There is a monarticular form of arthritis deformans occurring in old people; the hip is the most frequent joint affected, although the knee or ankle may be affected; pain is always a

marked symptom; the joint gradually becomes stiff and ankylosed.

A multiarticular form, confined almost exclusively to the joints of fingers and sometimes wrists, with marked Heberden's nodes at the base of the terminal phalanges, is common in old people, especially women who have worked hard and have been illy fed. Except for the deformity, it bears no relation to true "arthritis deformans." It is more of a degenerative than an inflammatory process.

## GOUT.

In this affection there is inflammation of the synovial membrane and the soft parts around the joint, with the deposition of sodium biurate about the capsule in cases of long standing.

In chronic cases there is great tendency to arterial sclerosis, myocarditis, chronic nephritis, emphysema, and cirrhosis of liver.

**Acute gout** begins suddenly, usually at night, with sharp pain in one joint, especially the first joint of big toe; it may begin in knee or smaller joints of upper extremity; sometimes more than one joint is affected. Swelling with redness of the skin over the joint takes place very rapidly; there is exquisite tenderness to touch.

Fever is often absent, but there may be a slight elevation for a few days; the attack passes off in a week or ten days; such attacks occur at variable intervals; as a rule, every six or eight months; but they occasionally occur more frequently and often only at intervals of one or two years.

In early cases after the attack the joint returns to normal condition, but after repeated attacks it becomes permanently enlarged from the deposition of sodium biurate.

The urine during and immediately after the attack is concentrated, rather diminished in quantity, and contains an excessive quantity of uric acid and amorphous urates.

**Chronic gout** shows permanent thickening, stiffness, and loss of function in many of the smaller joints, especially of hand and wrist; there is always some tenderness and pain, but, as a rule, the disease has exacerbations of acute gout.

In chronic gout the joints may not show many changes, but there are rather characteristic changes in heart, arteries, and kidneys. The heart is usually hypertrophied; there may be a systolic murmur at the aortic area transmitted into the great

vessels of the neck, which is due to atheromatous changes in the valves or aorta; a systolic murmur is often heard at the apex from relative mitral insufficiency. The aortic sound is accentuated. The pulse is thickened and the arterial tension is increased.

There may be emphysema; cirrhosis of the liver is common in hearty eaters or alcoholic cases. The urine is often normal, but in many cases the kidneys give the signs of chronic diffuse nephritis without exudation.

Symptoms of cerebral endarteritis are frequent; vertigo, attacks of syncope, and apoplexy are the most common. The eye may be affected with conjunctivitis, keratitis, or scleritis.

The skin is very liable to chronic eczema, especially about ears, neck and face, around the genitals, and between the thighs. Pruritus is a frequent complaint, especially at night. The nervous system may be affected; neuralgia, especially of the face, is frequent; sciatica is not uncommon.

**Irregular gout** is the name given to sudden symptoms with which gouty subjects may be attacked.

"Cardiac gout" is an attack of disturbed heart action, always irregular and usually very frequent and overacting, which lasts for hours or days.

"Visceral gout" takes the form of severe abdominal pain, constant in nature, with much tenderness all over; there may be vomiting and diarrhœa. The stomach may be suddenly upset; violent vomiting, especially of bile, is frequent.

"Retrocedent gout" is an attack of articular gout which suddenly ceases and is followed by severe and sometimes fatal symptoms referable to heart, brain, or stomach.

## OSTEITIS DEFORMANS.

This disease occurs in people past middle age; many bones soften and bend. In a few cases only one bone is affected.

The general health is not affected. The onset is very insidious. The whole bone becomes greatly increased in circumference from inflammatory exudate.

The skull seems much larger. The ribs, sternum, and clavicle are thickened, and the chest falls in. The long bones become curved. Walking becomes difficult or impossible.

The course is very slow; death is usually due to interference with lung function.

## ACROMEGALY.

This disease is characterized by enlargement of the bones of hands, feet, and face; the skin is thick and the hair in places becomes long and coarse.

The features are much changed, the inferior maxilla especially is enlarged, the lips are heavy and thick, the nose and brows are prominent, and the cranium looks small by comparison.

The spine usually shows a posterior curve in the dorsal region.

The thorax is flattened from side to side.

The hands and feet are greatly enlarged, although the shape is well preserved. Headache is a very frequent symptom, there is general lassitude, the speech is thick and slow, and the tongue large and flabby.

There may be blindness, loss of taste and smell.

In women the menstrual function usually ceases.

# CHAPTER XIX.

## DISEASES OF ASSIMILATION.

### RICKETS.

**Rickets** is a constitutional disease occurring in infancy and occasionally in early childhood. The disease almost always develops during the second year of life and very seldom occurs after the third year, but cases have been seen as late as ten years of age. The diagnosis in a well-marked case is readily made.

The head looks large and square. On the frontal bones especially, and sometimes on the parietal and occipital, there are well-marked bosses; the fontanelle is large and the edges of the bones forming it are thinned.

The hair covering the occiput is thinned or lost.

Sweating, especially about the head, is a frequent symptom.

The teeth have either not appeared or are poorly developed and decayed. In some cases the condition of the teeth is good.

The chest shows very characteristic changes; the bony junctions of the ribs with the costal cartilages are much thickened, forming in some cases a well-marked "rosary;" this thickening is usually one of the first signs of rickets; there may be depression of the sternum or the soft ribs may fall in and produce pointing of the sternum—the so-called chicken-breast. A groove beginning at the end of the sternum and extending laterally on each side of the chest below the nipple is of frequent occurrence; this is owing to the pull from the attachments of the diaphragm, aided by pressure of the atmosphere; this groove is made much worse if the child has bronchitis or adenoids; as a fact such a groove can be brought about solely by bronchitis and adenoids in young children.

The long bones are usually affected at their epiphyses, where there is marked thickening; this is especially so at the wrist and ankles, but may be seen above the elbow and at the upper end of the humerus and lower end of the femur.

Owing to the weight of the body the lower part of the tibia is bowed anteriorly and often outwardly, producing the well-known "bow-legs."

The child may be fat and large, but is usually puny and badly developed in every way; it is late in walking and limbs at times may seem almost paralyzed.

The belly is usually large and distended.

FIG 10

Rachitis. Attitude in sitting; one hand raised to exhibit swelling at the wrist. (Williams.)

There are tendencies to certain nervous conditions; fretfulness and great sensitiveness to touch are common.

Laryngismus stridulus, which is a sudden arrest of respiration followed by a high-pitched, crowing inspiration, is a frequent symptom.

Convulsions, which are usually general, are very common.

Tetany, which is a state of tonic spasm of many of the muscles of extremities, is seen in some of the cases. The thumb is

adducted and drawn to the middle of the palm, with tip placed forcibly against the middle phalanx of third finger; the fingers are extended, drawn together and overlap, and the palm is hollowed; the wrist is slightly flexed.

The feet are affected in a like manner, but usually less in degree.

FIG. 11

Rachitis in moderate degree in a boy aged fifteen months, showing backward excurvation of the spine. (Williams.)

In some cases the spasm extends to the muscles of the trunk.

The tetanoid state continues during sleep and may last for weeks; remissions occur from time to time. There is usually a tendency to pneumonia, bronchitis, and adenoids.

Slight cases of rickets may show a little sweating, some beading of ribs, irritability, convulsions, or laryngismus stridulus.

## OSTEOMALACIA.

This affection is characterized by gradual softening, bending, and sometimes breaking of the bones.

It occurs much more commonly in women between twenty-five and forty-five; pregnancy seems to have some causative relationship. The diagnosis is made by the general debility, pains in bones, difficult walking, curvature of the bones, sudden fracture without cause, and in some cases great pelvic deformity.

In some cases the deformity of the whole body is very great; patients may die from pulmonary affections owing to the interference with the mechanics of respiration. Other cases progress slowly, the pelvis being chiefly affected. Some cases recover under treatment.

## DIABETES.

**Diabetes Mellitus.**—Diabetes mellitus is a disease characterized by the persistent passage of glucose in the urine.

It occurs at all ages, but is more common between fifty and sixty; the sexes are about equally affected, though it is often less fatal in women.

There are two classes of cases: in one it has a profound effect on nutrition and is irremediable; in the other nutrition is not much disturbed and remedies are more or less potent.

The amount of sugar passed may be from five to forty grains to the ounce, and the quantity of urine is five to fifteen pints daily.

The only pathological lesion which often seems to be a cause of diabetes is inflammation or a new-growth of the pancreas, but apparently this is more an accidental rather than a constant cause.

Severe cases of diabetes vary in duration, sometimes lasting less than six months, but they usually go on for a few years before producing death.

A well-established case is easy to recognize, but early cases can be determined only by examination of the urine. In a well-marked case the appearance is sallow and emaciated, the skin is usually rough and dry, perhaps covered with branny scales; the hair has usually lost its lustre and is dry and brittle; there may be a sweet, chloroform, or banana-like odor to the breath due to acetone.

This appearance and the history of excessive thirst with the passage of large quantities of urine are often enough to make a diagnosis on, but, of course, the urine is the essential key to the situation.

The urine usually has a specific gravity above 1025 and may be 1040, it contains up to forty grains of sugar to the ounce, it is of pale-yellow color, and is strongly acid.

There are a number of complicating affections which are somewhat characteristic and point to the disease. The skin is frequently affected with persistent boils, acne, and carbuncles, especially in older subjects; in young people a papular erythema, rose-colored, elevated about the size of a split-pea, may be seen thickly distributed around the ankles, wrists, elbows, knees, and palms of hands.

Diffuse erythema may be seen on face. Eczema, especially on the genitals of women, is a most distressing affection; it may spread over thighs and abdomen; pruritus is intense.

Around the ankles and instep are sometimes seen little areas of necrosis, beginning in the sweat glands.

Gangrene and cellulitis are sometimes seen in the toes, feet, and fingers of men especially.

Perforating gangrenous ulcer of foot is not uncommon; it is preceded by a circumscribed anæsthetic patch on the skin.

The heart may be weak and show signs of fatty degeneration.

The stomach may be dilated, especially in children.

The lungs show a very marked tendency to tuberculous inflammation.

The gums are apt to be inflamed, and may bleed very easily.

The eyes may show impaired vision, and the perception of light on the retina may be diminished—the so-called diabetic amblyopia.

Cataract is frequent. Scleritis is of rare occurrence.

Retinitis which is sometimes hemorrhagic occurs occasionally.

Otitis media sometimes occurs without any catarrhal inflammation of nose or throat; mastoiditis is secondary to this.

Neuralgia is very frequent; sciatica, if double, is rather characteristic.

Headache, dizziness, epilepsy, or apoplectic seizures, as if there was an intercranial growth, may occur, and sometimes with these symptoms there is strabismus, ptosis, paralysis of a limb, or complete hemiplegia. There may be symptoms resembling locomotor ataxia, due to neuritis of the sciatic nerve; occasionally in these cases the pupillary reflex is abolished; the soles of the feet may be hyperæsthetic, with glossy skin, loss of nails, perforating ulcer. Diabetic coma may terminate the disease; it is

usually brought on by excitement, exposure or fatigue, or some intercurrent acute disease.

The onset is usually characterized by languor and great weakness of a few days' duration; rapid respiration precedes the coma; the pulse becomes frequent, and drowsiness sets in; the urine is diminished or suppressed; the breath is sweetish, like banana or chloroform. Acetone is found in the urine. Death may be preceded by a rise of temperature, by convulsions, or cyanosis.

Mild cases of diabetes mellitus occur almost altogether in people who are advanced in years; such cases may live for twenty or thirty years; if the diet is regulated the sugar is almost completely controlled; if much sugar or starch is eaten, diabetic symptoms manifest themselves very quickly.

In these cases pruritus, eczema, and boils are the most frequent disturbances.

**Diabetes Insipidus.**—This condition is characterized by the passage of a very large quantity of urine of low specific gravity; there is intense thirst, gradual emaciation, and exhaustion.

It may occur at almost any age, but is more frequent in young male adults.

The diagnosis is made by the history of the passage of excessive urine, anywhere from six to fifty pints a day, with excessive thirst and voracious appetite, and by the examination of the urine, which is of low specific gravity, 1002 to 1005, containing no abnormal ingredient. There are mild cases which go on for years without very marked polyuria and little change in general health.

Some cases run a fatal course in a few years; besides thirst, bulimia, polyuria, emaciation, there may be marked gastric and intestinal symptoms; anorexia occurs in the late stages; severe attacks of diarrhœa are common; the tongue is red and glazed; there may be gradual loss of renal function, and uræmia occurs in some of the cases.

Disturbances of innervation are not infrequent; severe racking pains in the lumbar region, intense headaches, sudden blindness, and insomnia may be distressing; convulsions and coma may terminate the disease.

# CHAPTER XX.

## INFECTIOUS DISEASES.

### EPIDEMIC CEREBROSPINAL MENINGITIS.

MANY epidemics of this disease have occurred, but there have been no marked outbreaks of the disease in the United States since 1874 until 1893, 1903, and 1904. Sporadic cases are not infrequently seen, and in all large cities the affection seems endemic.

The onset is usually sudden; chills, rigors, or convulsions are frequent, but headache, malaise, and fever may usher the trouble in. Characteristic symptoms soon make their appearance; pains in the head and back are terribly severe; there is photophobia; the eyes, especially in children, may turn upward or squint; the pupils are at first contracted and the conjunctiva is suffused. The muscles of neck usually contract and the head is held back and is stiff; the skin, especially of body and extremities, is hypersensitive.

The heart's action is variable; it may be hesitating and somewhat irregular.

Vomiting is frequent in the beginning; it may be projectile.

In severe cases opisthotonos may occur. As the disease advances the pupils dilate and become insensitive to light; delirium sets in and finally coma.

Some cases recover before severe symptoms have occurred.

The temperature seldom runs very high and has no characteristic course. The pulse is usually soft, it is not frequent at first, and is often irregular; in the late stage the pulse becomes very frequent.

Twitchings of the limbs are very common; general convulsions may occur in children.

Paralysis of the ocular nerves or spasm causing squint may occur; ptosis is sometimes seen; the pupils may be contracted at first, often unequally; in the late stage they are dilated; optic neuritis is sometimes seen.

Rashes are sometimes characteristic and important, but often they are entirely absent; they may be erythematous, urticarial, or spots of rose color; the most common are hemorrhagic and herpetic.

Herpetic rashes occur on the lips and face, they usually occur before the fifth day of the disease and afterward may come out in crops; occasionally herpes is seen on the trunk and limbs; they may be symmetrical.

Hemorrhagic rashes are usually petechial, but there may be hemorrhages which look like the rash of purpura simplex all over the body, but chiefly on the legs; some of the spots are almost black, irregular in size and shape; the spots become brown and then yellow. In very severe cases hemorrhages sometimes occur in the mucous membranes.

In cases which recover, sequelæ may be important.

Blindness from optic atrophy, iritis, keratitis, and without apparent cause may follow severe cases.

Deafness may result from otitis media or disease of the labyrinth.

Chronic hydrocephalus has been seen to follow a number of cases; the patients seem to be convalescent, when attacked with headache, convulsion, stupor, and coma, due to the increasing effusion in the lateral ventricles.

The differential diagnosis of cerebrospinal meningitis may be very difficult early in the disease, especially in children.

Tuberculous meningitis may be quite acute, and at first differentiation might be impossible; the absence of rash is not of much value; one must base his opinion on the less acute course and on the appearance, surroundings, and family history of the patient. In most forms of tuberculous meningitis contraction of muscles of neck and back are not marked.

Pneumonia in children and in apical forms of adults may sometimes begin with marked cerebral symptoms, headache, delirium, and photophobia.

The physical signs in the lungs, the absence of change in pupils, squint, rigidity of muscles of the neck usually clear these cases up.

Epidemic influenza may begin with violent headache, pain in the back, delirium; in these cases the prevalence of influenza, the absence of eye symptoms, and lack of rigidity in the muscles of the neck make the case apparent.

Gastrointestinal toxæmia in children may produce stupor, convulsions, contracted pupils; the absence of muscular rigidity, squint, with the history, perhaps, of gastric trouble, will solve these cases.

Kernig's sign—the resistance to straightening the leg when the thigh is flexed—is often present, but it may be found in other conditions and in a doubtful case would hardly be relied upon for diagnosis.

Babinski's big-toe reflex—the extension of toe when the sole of the foot is tickled—is also unreliable.

The demonstration of the diplococcus intracellularis in the cerebrospinal fluid obtained by lumbar puncture is of great value in diagnosis, and may be obtained in a majority of the cases; its absence is of negative value.

## EPIDEMIC INFLUENZA.

There is no disease capable of more variation in its course and symptoms than epidemic influenza; there seems to be no one feature which is necessarily present in every case, and yet the vast majority of cases have a definite set of symptoms which run a fairly regular course. The onset is sudden, usually without prodromata, the first symptom being severe headache, chiefly frontal, with pains in the back and extremities; the headache and pain in the back are sometimes almost unbearable. There is a sudden rise of temperature to 103° or 105°.

The pulse may not be over 100, although in some of the cases it is much more rapid.

The tongue becomes coated with a brownish-yellow fur.

The stomach is usually upset, anorexia is complete, and vomiting may take place. The bowels are constipated.

Catarrhal inflammation of the nose and bronchial tubes may be present. The symptoms continue very acutely for three days and gradually subside, the attack being over in about one week. Prostration usually follows the disease and convalescence is slow. Irregular types are very frequent. Nervous types are very serious.

In comparatively rare cases the brain seems to be overpowered by the intensity of the poison at the very onset; a man might drop in his boots and remain for several hours in an almost unconscious state.

Meningeal cases resemble cerebrospinal meningitis because of the intensity of the headache and pain in the back and disturbed cerebration, but there is no rigidity of the muscles and no eye symptoms. Cases seldom die from the intensity of cerebral symptoms.

During convalescence and in some cases for months afterward there may be great mental depression, inertia, or melancholia; even insanity may develop and neurasthenia is frequent.

Pulmonary types are among the most frequent; the most severe cases are those in which there is an intense congestion with severe dyspnœa. The physical signs show very sticky, dryish rales on inspiration all over, especially at the bases; the breath sounds are feeble and shallow; death in these cases is not uncommon from the very intensity of the pulmonary disability.

Severe bronchitis is not infrequent; in most cases it is general, but in the milder cases it may be patchy or confined to one lung.

Pneumonia is one of the common, and often fatal, complications, especially in old people; the consolidation usually develops on the third or fourth day, although it may be the earliest sign and overshadow the true grip features. The pneumonia is usually irregular, seldom running a typical lobar type; the consolidation is more apt to involve a portion of one lobe or, perhaps, two or more lobes are affected incompletely. The course of the fever is rather irregular and defervescence is seldom by crisis.

Bronchopneumonia is sometimes seen, especially in children.

Pleurisy with effusion and empyema are not infrequent, the first as a pure complication and the other secondary to pneumonia.

Gastrointestinal types are those in which the poison seems to spend itself on the stomach and bowels; there may be acute gastritis, but more frequently the bowels are affected with an uncontrollable diarrhœa during the first stages.

There are relapsing types, although these are very infrequent. The ordinary symptoms may have abated and during convalescence there may be a milder repetition of the early symptoms. Cases which are characterized by repeated and severe chills are sometimes seen; as a rule, there is no chill at the onset, yet a moderate chill may usher in the disease; but these are not the cases referred to. In the special type with chills the seizures

may occur twice in one day or there may be an interval of a few days; there is no definite time for the chill as in malaria, and no plasmodia are found.

Cases without fever are by no means uncommon, in such cases great weakness and inertia are the chief symptoms.

The complications of grip are very numerous, many of them have been mentioned in describing the types; other complications may occur in any of the types.

Conjunctivitis and iritis are among the rare complications.

Coryza and pharyngitis are present in the majority of cases.

Otitis media is a frequent complication. Bronchitis is not infrequent. Pneumonia is more frequent than bronchitis.

Pleurisy is rather uncommon.

Empyema may follow pneumonia.

Endocarditis and pericarditis are very rare.

Nephritis, of the acute exudative type, is occasionally seen.

Peripheral neuritis is a rare complication. The skin may show rashes during the acute stages; these are most frequently erythematous or urticarial.

Tuberculosis may follow grip from an infection received during the period of convalescence.

## DIPHTHERIA.

Diphtheria is a specific inflammation of the mucous membrane of the throat, nose, larynx, and sometimes of the conjunctiva, vulva, and vagina, due to the Klebs-Loeffler bacillus; it is characterized by the formation of a false membrane, and by symptoms due to the local inflammation and the absorption of toxins.

The usual course is a gradual onset, with the occurrence of fever and sore throat simultaneously; during the first twenty-four hours the throat is simply congested, then the membrane forms fairly rapidly; the symptoms now depend on the degree of local inflammation, its extension to neighboring parts, the toxæmia and complications; the duration is from one to two weeks; the convalescence is rapid, or is interrupted in many cases by post-diphtheritic toxic symptoms or sequelæ.

Prodromata are seldom marked; there may be slight fever, anorexia, and malaise before the throat symptoms are complained of.

The throat gives early symptoms; at first there is slight pain on swallowing; in young children this may be manifest by the disinclination to swallow or take food; children may also have a little hacking cough.

Breathing through the nose may seem a little obstructed, and the voice is nasal and less resonant.

Coryza or nose-bleeding may show that the disease has attacked the mucous membrane of the nose.

The neck begins to swell early from enlargement of glands at angle of jaw and infiltration of soft parts.

The throat at first shows only congestion and slight swelling; it may be somewhat pale. A false membrane soon appears; at first these are small spots, especially on the tonsil, but often on the uvula or any other part of pharynx; a continuous, whitish-gray membrane soon appears, and usually spreads rapidly to adjacent parts; in mild cases it may be confined to the tonsils, but in virulent cases it spreads all over pharynx, fauces, uvula, and posterior nares. The membrane is usually adherent, but in some cases can be removed easily by a brush; as a rule it sticks and forcible removal produces a ragged, slightly bleeding surface. In bad cases the membrane becomes blackish and the breath is quite putrid.

Swelling of the soft parts of throat under membrane is in proportion to the intensity of the inflammation, and in bad cases forms a serious obstruction.

Mucopurulent discharge in severe cases is very marked; it may be very offensive.

When the inflammation begins to subside the false membrane is cast off in the form of shreds or in portions of some size, but usually by gradual detrition.

The membrane, in some cases, forms again after it has been cast off.

Enlargement of the lymphatic glands at the angle of the jaw usually occurs as the false membrane forms; in some cases they are felt before this is seen, probably because it is behind the uvula or in the posterior nares; the degree of inflammation is usually in proportion to that in the throat but does not always denote virulency of the poison. Periadenitis is sometimes very marked; there may be rather marked tenderness over the swelling. There may be slight redness, but suppuration is very uncommon. Inflammation of the parotid and submaxillary gland is some-

times seen. The mouth is generally in good condition; in prolonged cases slight bleeding of the gums is sometimes seen.

Nasal diphtheria shows itself by stoppage of the nose and a bloody mucopurulent discharge.

Laryngeal symptoms usually occur if the infection attacks the larynx, which is generally about four days after the throat affection begins; in many cases it is not until later.

Laryngeal diphtheria may be a primary affection, but is not frequent. The presence of this condition is first suspected by the hoarseness of the voice and aphonia, which soon follow; after this comes the symptoms and signs of obstruction; a stridulous noise may be made at each inspiration; there is increase of the muscular action of neck during inspiration, and the alæ may dilate and contract; the face has an anxious expression, and the color may be somewhat cyanotic.

The temperature is of irregular type; the initial rise may be 102°; it often falls a little before the membrane appears. During the disease the fever seldom reaches 104°, and is usually around 101°. In malignant cases the temperature is apt to be subnormal.

Albuminuria is to be expected during the height of the disease, but it may come on after throat symptoms have diminished; the amount in some cases is not more than a trace, but there may be considerable; it is not a sign of gravity, but, as a rule, a larger amount is found in the severe cases. In fatal cases suppression of the urine is usually present before death.

Acute nephritis shows itself by diminished urine containing albumin, red cells, and casts.

Chronic nephritis following diphtheria is not frequent.

The blood may be changed in cases of malignant diphtheria; it looks brownish or like prune-juice as it bleeds from the mouth and throat; it gives the complexion a livid, grayish hue.

Hemorrhagic tendencies often develop in bad cases; it is usually from the mucous membrane of the throat, mouth, and, occasionally, from stomach and bowels. Purpuric spots and extravasations may be seen in the skin.

The heart is seldom affected either by pericarditis or endocarditis, but the diphtheritic toxins have a profound effect on the muscle, and sometimes on the nerves.

Heart-failure is of more frequent occurrence in this than in

any other infectious disease; it occurs more frequently in prolonged and severe cases, and may be gradual or sudden; in many cases it comes on after the worst of the disease seems over. In slow failure the pulse gets smaller and more frequent, sometimes irregular; the heart sounds are feeble; there is dyspnœa on exertion; the face becomes very pale, and there is much general depression; such symptoms may go on for a week before death occurs.

In sudden failure the face becomes very pale, anxious, and drawn; dyspnœa is marked; prostration is severe, and death occurs in a few hours.

The heart may fail suddenly during convalescence from neuritis.

Vomiting may be a very serious symptom; it occurs in cases of heart-failure, and is associated with acute nephritis of severe type.

Paralysis may be a sequel, and occurs in about 10 per cent. of the cases of pharyngeal diphtheria; in most cases it commences about three weeks from the beginning of the attack, but may occur sooner or as late as the sixth week.

There seems to be no relation between the severity of the initial lesion and paralysis.

The majority of cases recover completely; fatalities are chiefly from laryngeal paralysis, through foreign bodied pneumonia or from cardiac paralysis.

The soft palate and fauces are usually affected first; there may be great difficulty in swallowing, with regurgitation of food through the nose; the affection often ends here, and recovery takes place within a fortnight.

The laryngeal muscles may be affected; this is always serious, but recovery often takes place. Aphonia, hoarseness, and choking are the signs.

The limbs may be paralyzed; the legs are usually affected first; the arms often escape; the gait may be staggering, or walking is quite impossible; there is much wasting; electrical reactions are normal. Recovery always takes place, although it may take eight months.

Paralysis of the respiratory muscles may be the cause of death.

The eyes may be affected, due to asthenopia, amblyopia, or ophthalmoplegia externa.

Eruptions occasionally occur; purpura and erysipelas are

sometimes seen, but erythemas and urticaria are more frequent; suffusion of the skin may resemble scarlet fever.

The differential diagnosis of diphtheria may be exceedingly difficult, especially in the early stages. Swallowing of caustics may cause an appearance which cannot be distinguished from diphtheria, except from the history and general symptoms.

Follicular tonsillitis resembles diphtheria occasionally in its early stages; the spots occupy the crypts, and are not on the elevations between them as in true diphtheria; the constitutional symptoms are more sudden and severe in tonsillitis at the onset. As a general rule, the patchy nature and tendency to spread to other parts than the tonsil makes true diphtheria easy to recognize after a few hours.

**False diphtheria** which is accompanied by a membrane is really indistinguishable from true diphtheria and will always be found puzzling.

These cases may occur without known infection and are no more contagious than ordinary tonsillitis.

The membrane in scarlet fever seems to belong to this class.

The constitutional symptoms may be very severe, and death may be caused from the severity of the local inflammation and its toxins.

Secondary paralysis is not found in these cases.

The only possible way in many cases to make a correct diagnosis is by a culture of the micro-organisms.

In scarlet fever throat symptoms may precede the rash, a membrane may be present before the eruption appears, or the eruption may have been overlooked. The throat usually seems more angry, but this point is not a very serious one in the differentiation.

The glands of the neck are more apt to suppurate, but this only occurs at a late date; so it is of no value early in the disease.

A culture is often the only way of making the diagnosis.

Fungous growths such as the oidium albicans and leptothrix buccalis, occurring in and about the tonsil, should never be mistaken for diphtheria, save by the inexperienced. The color is white, there is little local inflammation, and it can be brushed off; there are no constitutional symptoms.

The value of cultures in the diagnosis of diphtheria is far from being satisfactory in all cases. In the making of the cultures there are difficulties to begin with; the smears from

the throat may not be properly taken, the nursing of the growth may be at fault, while the appearance of the bacillus may not always be positive, even to an expert.

If the bacillus is found it does not prove the case to be diphtheria, as the Klebs-Loeffler bacillus is found in many throats with no inflammation; however, if the clinical appearance is that of diphtheria and the true bacillus is found, one would have little doubt of the diagnosis. The absence of the bacillus after repeated cultures is of great value in the negative diagnosis.

## ASIATIC CHOLERA.

Asiatic cholera is a specific infectious disease which prevails endemically in India, from whence it may be carried to other parts and occur as an epidemic. It is caused by Koch's cholera bacillus, although this has not received entire acceptance. Cholera runs, in most cases, a pretty definite course which is marked by stages.

The stage of incubation is from the time the poison is received into the system until the symptoms become acute; this period is from three to six days, although it is difficult to be precise. During this period there may be disturbed stomach and some diarrhœa; there may be malaise, depression, and anorexia; in many cases there are no prodromata, but the disease starts in with violent purging, vomiting, and abdominal cramps, with speedy exhaustion; this, the stage of evacuation, may last from two to twelve hours; the stools are at first feculent and then become pale and watery; a curdy sediment may be deposited on standing.

Pains are not always present; the muscles of the leg and back may become cramped and hard; the temperature falls; there is great thirst; the features rapidly change, becoming drawn; the pulse is rapid and feeble. Recovery may take place at this period, but the disease usually goes on to the next stage, which is called the stage of collapse; this may last from a few hours to forty-eight; there is not as much diarrhœa, but watery stools may be passed.

Vomiting and cramps may persist. The general strength fails rapidly and the pulse becomes very small and frequent; the heart sounds are feeble and strange murmurs may be heard.

The color becomes cyanotic and livid; respirations are frequent and difficult. The face is drawn and pinched; the pupils are contracted and the mouth is covered with sordes; the tongue is brown and dry.

The intelligence is clouded or there may be coma. The urine is suppressed. The temperature is below normal.

The breath is peculiar and characteristic. Death usually occurs in this stage. The stage of reaction which may follow the stage of collapse is characterized by a general return to normal conditions, although other conditions may present themselves and lead to a fatal issue.

Irregular cases of Asiatic cholera are quite frequent.

During an epidemic some people suffer with sharp diarrhœa and malaise, but the symptoms pass off; some of these cases have "rice-water" passages, and these clear up without severe symptoms. Some cases pass into collapse almost at once; there may be no diarrhœa; these cases are very virulent and fatal. Some cases become stuporous before the onset of the regular symptoms.

Others have suppression of urine and anæmic symptoms after the stage of evacuation.

Others pass into the typhoid state with dry tongue, fever, delirium, and subsultus.

Sequelæ are not uncommon. There may be anæmia, chronic diarrhœa, dementia, or paraplegia. Complications may be pleurisy, pneumonia, meningitis, and ulceration of the cornea. Occasionally there is gangrene of nose, fingers, and toes.

## BUBONIC PLAGUE.

Plague is an acute infectious disease accompanied by fever and inflammation of lymphatic glands, due to the bacillus pestis.

The disease is endemic in some parts of India and China; the virus or germ seems to exist in the soil.

The disease may be carried to other countries and spread as an epidemic, although under conditions of great drouth, famine, or war it is believed that in some places the germ growth is favored and may infect the people. Epidemics usually terminate in from three to six months.

The poor are much more liable to the disease on account of uncleanliness and crowding.

Good sanitation seems an effectual barrier against the disease.

Communication of the disease does not seem to take place by direct personal contact of the sick with the healthy, but rather through the atmosphere in a close, ill-ventilated room containing the sick. It can be communicated by fomites. The disease affects rats and other animals, and can be carried by them. The spread of the disease does not seem to be like an ordinary atmospheric or personal contact or water-carried disease, but is very slow in most epidemics, and creeps along as if a certain degree of saturation of air took place before it could spread.

There are two distinct forms or courses in which the disease is seen. Pestis minor is a mild form. Pestis major is the severer or ordinary form.

Pestis minor is characterized by glandular swellings, very little fever, and no marked general symptoms. It does not appear contagious, and when seen is almost always weeks or months before an ordinary outbreak of the disease. The duration is usually about two weeks and ends in recovery or takes the severer form.

Pestis major is the ordinary form of bubonic plague.

There is a period of incubation of from three to five days; it practically is never longer than one week from the time of exposure.

The prodromal stage is sudden in its onset in many cases, but the first symptoms may be headache or vertigo, with staggering gait; there may be great absentmindedness, with purely mechanical actions. The face is pallid, eyes congested, and very stupid manner and appearance. There may be pains in the extremities and great malaise.

The tongue is at first coated white, with red edges; it soon becomes brown and dry. There may be bilious vomiting. These symptoms rarely last longer than a day.

The febrile stage immediately follows the first stage or may mark the beginning of the disease. The fever is ushered in, as a rule, with a marked chill; the temperature rises rapidly and may reach 107°, but is usually about 104°; the pulse is from 90 to 120, and is soft and weak.

There is excessive thirst and burning in the throat. The bowels are constipated. Prostration is severe. The mind becomes dull or comatose; sometimes there is active delirium.

The duration of the febrile stage is from two to five days; the fall of temperature is sudden, and it may not rise again. Cases which do well have falling temperature for about two weeks.

Inflammation of the lymphatic glands, with swelling, commonly called buboes, is very characteristic, and is always present except in very rapidly fatal cases; the enlargement of the glands usually takes place before the fourth day of the disease; with their appearance the fever may fall slightly; the glands are extremely painful, although sometimes they are only discovered after careful examination; groups of glands are swollen, but one gland is usually larger than the rest; they are very hard at first, and may remain so, but they often suppurate, and such an occurrence is rather favorable. Very rapid softening and disappearance of the gland is seen in some fatal cases. In the suppurative cases which recover the discharge goes on for several days or weeks, leaving scars. The gland seldom gets larger than a walnut, although it may grow as large as an egg. The femoral, inguinal, and axillary glands are those most frequently affected.

Carbuncles appear in some of the cases. Purpuric spots or patches are seen in some of the severe cases.

Profuse sweating occurs in some of the cases.

Epistaxis, hæmatemesis, and hæmoptysis may be profuse, and they are usually ominous.

The nervous system is usually profoundly affected; there is much depression, delirium, delusions, and coma.

The stomach may be much upset. Diarrhœa is not infrequent, although constipation is the rule.

The disease lasts a variable length of time; it may be fatal within a day, but usually in from three to five days. Cases which recover do so in from two weeks to two months.

Mortality is very great, but varies with epidemics; 80 to 90 per cent. may die.

The diagnosis is seldom difficult, as practically no disease has any of the special features of bubonic plague.

## RELAPSING FEVER.

This is an infectious disease due to the spirillum of Obermeier, which is found in the blood during the fever and in the spleen during the interval of the relapse.

Destitution is the great cause of epidemics. The period of incubation is from a few hours to three weeks, usually about seven days.

The invasion may be sudden, without prodromata.

The patient is seized with a sudden chill, headache, and pains in the back; there may be vomiting and diarrhœa. Prostration varies, but is often very severe. In many cases there are malaise, bodily pains, and anorexia for a few days before the fever is at all marked.

The fever during the first few days ranges between 102° and 104°; the pulse is very frequent, and may reach 140; the respirations are hurried, between 30 and 40 to the minute. A distressing cough from bronchitis is often present.

A rose-colored rash has been seen in a small percentage of cases; it is not unlike the rash of typhoid, and appears on the thorax, abdomen, and limbs. The spleen enlarges early. The symptoms continue very acutely for about seven days.

The skin becomes jaundiced in most every case; the area of liver dulness increases, and there is tenderness over the hepatic area. Vomiting may be persistent. Pains in the joints are frequent. At the end of seven days, but occasionally a day or two before or after, there is a sudden fall of the temperature to normal, and the general symptoms disappear as if by magic.

In every case there is a relapse; the intermission is between five and nine days, and the time of the relapse is almost always on the fourteenth day of the disease. A chill ushers in the relapse, and fever follows rapidly; the other symptoms are like those of the primary attack, and sometimes are more severe. The duration of the relapse is from three to five days, and the symptoms disappear by crisis.

A third or fourth relapse has been seen, but are very infrequent.

The fall of temperature at the crisis is often three or four degrees below normal.

Fatal cases are very infrequent.

The diagnosis of relapsing fever may be difficult at the onset. Typhus fever is sudden in its onset, but a rash is almost always seen, while jaundice is not frequent, and the crisis is not before the fourteenth day. Influenza may resemble it at the onset; here there is no jaundice, no enlarged spleen, and no crisis to the symptoms. The best means of early diagnosis is the examination of the blood.

## YELLOW FEVER.

Yellow fever is an acute infectious disease occurring in some tropical countries endemically, and occurring epidemically in semitropical climates, and occasionally in temperate climates.

Incubation is from one to five days. The onset is usually abrupt, but headache, anorexia, and malaise may precede the onset by a day or two. The first symptom is usually a chill, which may be slight or very marked; sometimes it is absent. Severe racking headache, pains in the back and extremities, pallor of the skin, and fever are the symptoms of invasion. The fever rises, and may reach 107° before the third day. The respirations are hurried. The pulse is full and rapid. The stomach is upset; vomiting often occurs. The bowels are constipated. The urine is scanty and contains albumin. These symptoms usually continue for about three days, when there is a sudden abatement of the symptoms. This is the turning point of the disease. If the patient gets well the symptoms gradually subside. The skin is now somewhat jaundiced. If after a lull of from a few hours to two days the stomach symptoms become worse or are renewed, with increasing jaundice, and the vomiting of black or chocolate-colored flakes or vomitus comes on, the case looks most serious, and is usually fatal; the fever generally returns, but it may be subnormal.

Occasionally patients rally from this stage, but, as a rule, it is fatal; vomiting is persistent, jaundice increases, and the skin is sometimes covered with petechiæ. Hemorrhages may occur from the mucous membranes. The mind is often clear to the end, although usually there is apathy, and before death coma takes place. The course of the disease is very variable; many cases are very mild, and recovery always takes place. There are moderately severe cases, some of which die, but most recover. Grave forms of the disease may manifest unusual symptoms from the regular course.

1. The patient suddenly becomes dizzy and falls into a stupor, with dilated pupils. The pulse becomes frequent, feeble, and irregular. Hemorrhages may take place.

2. There is great prostration; the temperature falls below normal; the features are sunken. There is great tendency to hemorrhage, but jaundice does not occur.

3. In these cases intense purging and vomiting occurs. Petechiæ are found on the skin. Prostration is profound.

Complications are seldom found; either death or recovery takes place quickly. The diagnosis in mild cases may be difficult. A fever from digestive disturbance with catarrhal jaundice may easily be mistaken for yellow fever. In yellow fever albuminuria is almost always present.

Malaria with jaundice may resemble yellow fever, but the enlarged spleen is not found in yellow fever.

Remittent fever may similarly be recognized.

Relapsing fever is often accompanied by jaundice, and the diagnosis in the early stages could only be made by finding the spirillum of Obermeier.

## BERIBERI.

This is an acute infectious disease characterized by the occurrence of multiple peripheral neuritis, and often by neuritis of the phrenic and pneumogastric nerves. The infectious agent is unknown. It is seldom found anywhere but in the hot regions of Asia, where there is great crowding and poor sanitation. The period of incubation is indefinite. Premonitory symptoms are usually present for some days or weeks. There is languor, depression of spirits, cramps, and feeling of numbness in the legs. These symptoms are worse on some days than on others. There is usually anæmia, with puffiness of ankles or face.

The onset may be quite sudden, but in any case loss of power in the extremities, with feeling of tingling, numbness, paræsthesia, and pain in the calves are soon discovered. There may be some œdema of the lower extremities. The knee-jerks are absent. Breathing is difficult when the pneumogastric and phrenic are affected; there may be great substernal oppression. There is no fever. The mind is not affected.

These symptoms go on for weeks, when improvement sets in very slowly, and after several months full strength and power are restored. Although the above is a general description of the disease, it does not always follow such a typical course. In many cases dropsy is a marked feature, and the patient looks as if he were suffering from acute nephritis; in these cases muscular power may not be completely lost. In other cases the muscular atrophy is very great and very rapid; the patient is reduced to a skeleton.

In some cases with pneumogastric and phrenic involvement, heart symptoms, and substernal pain may be very severe. There may be cases with serous effusion in the pleural or pericardial cavities.

In exceptional cases the loss of power of all the muscles, and especially of the heart and diaphragm, is so rapid that death may be caused in twenty-four hours.

Œdema and lack of fever are the curious phenomena of this disease. The urine is less abundant, although the specific gravity is increased, but not in proportion to the diminished quantity of water.

The loss of power is greater in the lower extremities, particularly in the extensors. The pulse is generally frequent. In some cases it slows very markedly before death. Systolic functional murmurs are usually heard over the base and apex of heart. Palpitation of the heart is one of the distressing symptoms. Enlargement of the right ventricle is often seen in bad cases.

Death may be caused by œdema of the lungs from involvement of the diaphragm or from heart-failure, especially from dilatation and incompetency of the right ventricle.

## TETANUS.

Tetanus is an infectious disease due to the virus produced by the tetanus bacillus which is growing in an external wound or some place not evident. Much interest in this disease has developed recently because of the number of cases which have occurred after vaccination.

It has been almost conclusively proved that the infection was not carried by the vaccine virus, but was communicated later through improper care of the wounds.

In the great majority of cases there is a history of a wound, most frequently about the foot; it is very apt to be a penetrating wound. Simple fractures and dislocations have been followed by tetanus. Idiopathic cases have been known.

The period of incubation may be from one to twenty-one days, but it usually is within a week.

The first thing noticed is spasm of the muscles; in many cases the muscles first affected are nearest to the wound, but the spasm of the temporomaxillary muscles and those of neck are

usually the first diagnostic point; the muscles are persistently contracted with periods of more active spasm; in time most every voluntary muscle in the body becomes affected, but the involuntary muscles are not changed. Violent contractions which may bend the body backward (opisthotonos), or forward (emprosthotonos), or sideways (pleurosthotonos) are not often seen. The muscles are usually tender and there may be considerable pain. The temperature varies; in the early stages it is not often high, but in severe cases toward the end there may be hyperpyrexia. The heart is frequent, especially during the more active spasm; the severe thoracic spasm may greatly interfere with the heart's action.

Spasm of the glottis may cause the respiration to be very noisy and stridulous; even death may result from this cause. Spasm of the diaphragm and thoracic muscles may greatly embarrass breathing or cause its complete cessation.

The nutrition and strength fail rapidly, and the ability to take nourishment is greatly interfered with.

The duration of the disease is variable. Acute severe cases last from a few days to three or four weeks and are usually fatal. The less acute cases are much more favorable. Chronic cases may go on for months and usually recover.

The diagnosis is seldom difficult. Strychnine poisoning does not give the history of a previous wound; the muscles of the jaw are not particularly affected; between the spasms muscular relaxation is complete; termination is speedy by death or cure.

Hydrophobia gives history of bite; the muscles are relaxed between the spasms; the mind is not as rational; convulsions are more easily aroused, especially by the sight of water.

Hysteria may give repeated spasms, but relaxation is nearly complete between them; during spasms there may be unconsciousness. There is no history of wound, no fever; the convulsions seldom extend over a few hours and cure results, although relapses are frequent.

## RABIES.

Rabies is an acute infectious disease communicated to man by animals through the means of a bite.

The period of incubation is from three weeks to eighteen months, but shorter and longer periods may possibly inter-

vene from the reception of the bite to the onset of acute symptoms

The bite heals and may look well and show no signs before the onset of the disease. In many cases there is burning, itching, or sharp pains in the wound, or the scar may become livid and sometimes the wound reopens and discharges.

The first symptoms of the onset of the disease are usually irritability or depression. There is marked pallor and the face may be drawn. There is thirst with disinclination to swallow, loss of appetite, nausea, and general hyperæsthesia. The pulse and respirations become frequent. After a few days there may be marked excitement, with delirium; the eyes have a shifty look. The mucous membranes are congested and the throat may contain mucus which causes a sharp, rasping cough.

Thirst is intense, but on trying to swallow there is strangulation with the expulsion of the fluid with violence; the muscles of deglutition and respiration are thrown into spasm; respiration may cease momentarily.

Opisthotonos may occur. Tendon reflexes and skin sensations are markedly increased. A sudden noise, the sound of water, a bright light, or gust of wind may produce spasmodic contractions of muscles. Delirium is intermittent; raving is frequent, but quietness may be restored by an attendant. In bad cases the spasmodic attacks increase in frequency; it becomes impossible to feed the patient, and death is caused by asphyxia or exhaustion.

In favorable cases the spasms diminish and irritability lessens gradually. Mortality is about 16 per cent.

The diagnosis has to be made between hysteria, insanity, and tetanus.

In hysteria the patients may have convulsions, ravings, and may bark and snap like a dog, but there is not the peculiar throat and laryngeal spasm; the patient is not as sick; there is no fever, no hyperæsthesia, nor increased reflexes. Sensation may be diminished. There may be no history of bite, or the bite might have been from a healthy animal.

In tetanus the spasm is chiefly of temporomaxillary muscles and is more tonic. The history of wound is also important.

In insanity the spasm or convulsions are altogether different.

## GLANDERS.

This affection is a highly infectious disease communicated from horses to man, either through the nasal mucous membranes or by inoculation of a sore.

The period of incubation is short. The onset of the disease is marked by swellings and pains in the joints; inflammation of the lymphatics and liver. The mucous membrane of the nose and pharynx becomes swollen; there is a foul smell and discharge from nostrils; the glands in the submaxillary and cervical region enlarge. An abscess forms at the point of inoculation. Hard swellings are discovered in the muscles near the joints, which soften, break down, and leave foul ulcers.

The patient becomes feverish, often has chills, rapidly weakens, suffers from delirium, and may become comatose. Dyspnœa is a marked symptom. Diarrhœa is frequent.

There are chronic cases which develop swelling of nares slowly; the glands in different parts of body enlarge. Abscesses may form around the joints. Constitutional symptoms are not severe.

Acute cases are always fatal.

Chronic cases may recover.

## ACTINOMYCOSIS.

This is a chronic infective disease occurring in cattle which may infect man. It is caused by a fungous parasite, but the manner in which the parasite gains entrance into the body is not fully understood.

The site of the disease is usually around the head and neck, but it is frequently seen in the abdomen and thorax. The disease spreads by gradual invasion of any tissue at its periphery, but metastatic inflammations of similar nature may occur, though rarely.

The disease is more common in men than in women.

The course of the disease is usually chronic, but acute cases resembling pyæmia have been described.

In chronic cases constitutional symptoms are at first very slight, but in time there is loss of nutrition, hectic fever and special symptoms according to the organ affected.

The appearance of the disease, if seen on the skin or on the

tongue and about the jaw, is at first tumefaction, in time reddening of skin and mucous membrane, and finally a slowly sloughing surface.

When the disease is about the tongue, throat, or jaw there may be interference with swallowing or breathing.

In the lung we have signs resembling consolidation; the chest wall may be invaded secondarily and a sloughing surface will result. There is cough and expectoration and sometimes cavity formation.

In the abdomen the liver may be tumefied, with symptoms common to enlargement of liver and pressure on the portal vein or bile-ducts.

The peritoneum may be affected, giving the signs of tuberculosis or new-growth.

The diagnosis is difficult unless the disease is superficial or affects the lungs, when a specimen or expectoration may allow examination of the parasite by the microscope.

The disease is confounded with tuberculous, syphilitic, or malignant diseases. The diagnosis can only be made by microscopic examination.

## TRICHINOSIS.

This affection is due to eating meat which contains the encysted trichinæ. When such meat is swallowed the sac of the trichinæ is dissolved and the parasite is liberated in the intestine, where development continues and impregnation of the female worm takes place; the male worm then dies. In about seven days from the infection the female begins to pour forth her young and keeps it up for about six weeks, giving birth to many thousands. She then dies. The young trichinæ, as soon as born, migrate through the walls of the intestine and along the connective-tissue spaces to the muscles, where they become encysted.

The symptoms may be divided into three stages in most cases. The first stage is that of intestinal irritation, and begins two or three hours after the ingestion of the diseased meat, continues during the development and brooding of the parent trichinæ, and while the young worms are migrating through the walls of the intestine.

The second stage is that of myositis, and is characterized by

severe muscular pains and irregular fever, due to the embryo trichinæ entering the muscles.

The third stage is the encystment of the larval trichinæ and the gradual decline of the myositis. In many cases, especially mild cases, or in cases of repeated infection, stages cannot be accurately determined and the symptoms may be vague.

In the majority of cases the symptoms begin a few hours or at longest a day after the ingestion of diseased meat. There is evidence of gastrointestinal poisoning with vomiting, severe pains all over the abdomen, or cramps, diarrhœa, foul tongue, and considerable prostration. The larger the dose, the worse the primary symptoms. If the primary symptoms are severe, the secondary symptoms may not be as marked, because many of the worms would be expelled by the sickness. The diarrhœa and more or less gastric distress and insufficiency may go on for nine or ten days.

The second stage now begins with pains in the muscles, which become swollen and hard and very tender after being in action. The fever usually runs between 102° and 106°, with slight morning remissions. The muscles of eating, speaking, breathing, and locomotion may all be interfered with. Standing may be impossible. The patient lies in bed with limbs semiflexed. About the ninth day there may be a little œdema or puffiness under the eye. In about five weeks, in cases of much severity, there is marked œdema of face, neck, or trunk. The genitals are not affected; the œdema may be very great indeed. Sometimes it comes and goes. Profuse sweating is very continuous; miliary eruptions are often present. Wasting is very marked, and symptoms of the typhoid state are often present.

In adults insomnia is marked, but in children somnolence is the rule.

Bronchitis and hypostatic congestion of the lung are frequent.

As a rule, in five or six weeks convalescence sets in; it may come earlier or be prolonged for three months.

Most cases recover. Death usually occurs at the height of the myositis, and is usually due to pulmonary difficulties. In prolonged cases it may be from exhaustion.

Intestinal hemorrhages are sometimes seen.

The disease is easily recognized during an epidemic, but in sporadic cases it is apt to be mistaken for typhoid fever, rheumatism, multiple neuritis. A careful study of the symptoms

and history usually clears up the case. Examination of the blood is important, frequently showing a great increase in the eosinophile leukocytes.

## MEASLES.

Measles is the most common of all contagious diseases.

It occurs most frequently in early childhood, between the ages of two and six; those who escape are probably not brought in contact with the contagion, as there seems to be hardly any immunes; although increasing age makes one somewhat less susceptible, yet the severity of the affection is generally greater. Incubation is usually ten days, occasionally as early as five or late as fourteen.

The onset is marked by fever, malaise, and anorexia; vomiting may occur; constipation is the rule, although diarrhœa is frequent.

The first signs of measles in most cases are coryza and slight conjunctivitis, or watering of the eyes; on examining the mouth the so-called "Koplik spots" may be seen before the rash appears. The rash appears, as a rule, on the third or fourth day of the fever, at which time the fever is at its greatest height; the rash lasts from four to six days, the fever gradually falling from the time of its appearance until it reaches normal about the time of its disappearance.

A slight, branny desquamation begins soon after the rash fades, and continues for about one week.

Complications are numerous. The most frequent are: conjunctivitis, bronchitis, otitis media, bronchopneumonia, empyema pleurisy, laryngitis, and vulvitis.

The fever runs a rather typical course; at the end of the first day it is fairly high and reaches 102° or 104°; then there is a slight remission until the rash begins, when it may reach 105° or 106°; after this there is a gradual decline until the rash disappears.

The rash is first seen about the fourth day; little, reddish, ill-defined spots are found about the forehead, near the hair and behind the ears; it then spreads to the face and afterward is seen on the body and extremities. At the end of twenty-four hours the rash reaches its maximum and is characteristic; the whole body is covered, seemingly most intense on the trunk;

the color is dull red; the spots usually coalesce and are elevated a very little, giving the skin a rough feeling; about the centre of each spot there is the appearance of a slight vesiculation somewhat resembling sudamina. Crescentic formation is usually imaginary.

The rash is not always typical; in the early stage small spots may be confluent and form a continuous red rash; it is not as uniformly punctate as scarlet fever and is more elevated; there is also more rash on face.

The rash may fade very quickly or "strike in," as it is sometimes called. The rash may be more papular and shotty, with a slight tendency to vesiculation and pustulation.

The mouth is rather characteristic. Before the rash appears, little, elevated, warty-looking spots are seen on the buccal mucous membrane, opposite the space between the upper and lower teeth, the so-called "Koplik spots;" but these are not absolutely diagnostic. When the rash comes out, and sometimes a little before, red spots are seen on the roof of the mouth and soft palate.

**Complications** are most important. Conjunctivitis is almost a part of the disease, but a few cases are not affected; it is at its worst during the height of the eruption.

Stomatitis may be severe if the mouth is not kept clean; it takes the form of aphthous spots, which may ulcerate; a membranous-looking exudate may sometimes be seen; the stomatitis is most marked just before and after the rash appears.

Otitis media is frequent, especially in cases who have chronic pharyngitis, adenoids, or stomatitis; it usually occurs during the eruptive period.

Laryngitis is usually mild and simply catarrhal; occasionally œdema of the glottis occurs. In institutions membranous laryngitis is sometimes seen; it is always fatal.

Bronchitis is almost the regular thing in the prodromal and eruptive period; it is usually not serious, but in some cases during the prodromic period there is an intense congestion of the lungs, causing poor vesicular sounds and fine rales on inspiration all over both lungs; the breathing is shallow and hurried; some of these cases are fatal, others clear up during the eruptive stage.

Bronchopneumonia is the most frequent cause of death in measles; in institutions it is very common and usually appears

during the eruption, but sometimes before or as convalescence is about to set in; its course is not peculiar.

Vulvitis is sometimes seen in poorly nourished children.

Endocarditis and pericarditis and pleurisy are rare.

Empyema is frequent after pneumonia.

Hemiplegia is sometimes seen in cases which have had convulsions; recovery is seldom complete.

Muscular atrophy which looks like infantile paralysis is occasionally seen. Ascending paralysis may also occur.

Noma or gangrene about the mouth, vulva, cheek, throat, or ear may follow measles in very cachectic children.

**German Measles** bears a striking resemblance to regular measles, but when a case can be studied from the commencement to the end of the disease there is little chance of confounding the two.

There are several very marked points of difference. In German measles the prodromic period is much shorter, the temperature is never very high, the constitutional symptoms are not severe, the duration is shorter, the rash is somewhat different, and complications are few.

The prodromic period is about twelve hours; there may be a little conjunctivitis, coryza and sore throat, and swelling of some of the glands of the neck.

There may be a temperature of 101° or 102°.

The rash, which is often the first thing noticed to be wrong, is discrete; small, reddish-pink papules appearing behind the ears and around the orifices of mouth and nose; it usually extends over the body rather rapidly; in a few instances it may first appear on the trunk; sometimes it appears in crops, or appears on one part while disappearing in another.

The rash usually begins to fade in twelve hours; but before this a bright-red flush may spread over face and neck, while the limbs may be covered with a fine, punctate, red rash which looks like that of scarlet fever.

The temperature, which is about 101° or 102° during the rash, falls as it fades. There is usually some sore throat; the tonsils may be swollen, and the pharyngitis seems more severe than that found in a mild case of measles.

Enlarged glands, especially the posterior cervical, and those in front and behind the sternomastoid and behind the angle of the jaw, are almost surely found; this is an early feature

and may sometimes be detected a week before the rash appears.

Slight branny desquamation begins a few days after the rash disappears.

Complications are seldom severe. There may be bad tonsillitis and, in some cases, a false membrane forms.

Bronchitis and bronchopneumonia are occasionally seen.

Otitis media is not infrequent.

Cachectic children are more frequently affected by bad catarrhal inflammations.

Relapses occurring at intervals of a few days to two weeks have been seen.

The most important diagnostic point between this disease and a mild case of measles is the swelling of posterior cervical glands, the brighter color of the eruption, and the mildness of the symptoms. The presence of other known cases is also helpful in the diagnosis.

## SCARLET FEVER.

**Scarlet fever** is an acute infectious disease occurring chiefly in children.

The cause of the infection is unknown. This disease is one in which errors of diagnosis are very common. Such errors are very unfortunate on account of the spread of the contagion, and because of the remote sequelæ which might be prevented by proper precautions.

The disease occurs most frequently in the autumn. Children are most susceptible between four and six; the liability to the disease steadily diminishes after this age. Complete immunity is possessed by some individuals, being rather different from measles in this respect. One attack usually confers immunity, but this is not an absolute rule.

The period of incubation is from two to four days, rarely as long as seven. The invasion is almost always rapid; the first symptom is either vomiting, fever, sore throat, or headache. Sore throat is perhaps the most frequent early manifestation; in young children vomiting is very frequent.

The sore throat may last a week before the rash occurs.

The usual course of scarlet fever is, first, the symptoms of invasion followed in about twenty-four hours by the appearance

of the rash, first on abdomen, groins, back, chest, and thighs. The fever and throat symptoms increase in intensity; the lymphatic glands at the angle of the jaw swell. These symptoms increase in intensity until about the fourth day; the tongue may show the strawberry appearance. Abatement of the symptoms begins on about the fifth day, and between the sixth and ninth day the patient is convalescent.

The course is not always so favorable. In many cases, which are usually called septic, the invasion is severe, and the throat presents a serious condition; there is much general swelling and redness, the tonsils and fauces may be covered with an exudate or false membrane, the whole neck seems infiltrated, and the lymphatic glands are much swollen.

Swallowing becomes very difficult, and fluid may regurgitate through the nose. The tonsils, fauces, and pharynx may become ulcerated; there is a very foul odor to the breath. The disease runs a slow course; in less severe cases favorable symptoms may show during the second week, and there may be a gradual return to health; more often the symptoms increase and may go on for two or three weeks, when death takes place from exhaustion or septic poisoning.

Another class of cases are the so-called toxic or malignant cases. In rare instances the very intensity of the poison may kill in a few days. Other cases show the rash and throat signs rather poorly defined, but the constitutional symptoms seem disproportionately great. The pulse is very frequent and feeble. There is profound loss of nerve force. Temperature may be subnormal. Death usually takes place within a week.

Analysis of symptoms of ordinary cases shows, in the first day or two in most cases, a bright, flushed appearance of the face; the conjunctiva may be slightly injected. After about three days the face looks as if a little powder and rouge had been used. The skin over the upper lip and over the lower to the point of the chin looks white.

The rash usually appears within twenty-four hours, but often not until forty-eight hours.

It is often first seen on the chest and around the neck, but its beauties are best appreciated on the abdomen and back; it reaches its height in about three days, and has faded by the seventh. The color of the rash is bright and scarlet, almost brick red; in the beginning there are little, fine, slightly elevated

red points, which are soon filled in with a bright erythema; the punctate appearance is generally more or less preserved, but again increases as the rash fades. In many cases the hands and feet look reddish and somewhat glazed; they may be a little swollen and stiff.

On the outer surface of the arms and thighs there are often coarse papules, which persist after the true eruption has disappeared; these may be of considerable value in the diagnosis. In some cases on the small punctate papules, which are seen in the general eruption, a little vesiculation is sometimes seen.

The amount and degree of eruption is variable; in many cases it is very fleeting or the distribution is in irregular patches. In some cases the eruption has never been noticed.

Desquamation is very important because on it may hinge the diagnosis, and because it is the most infectious period. Its amount usually depends on the severity of the eruption.

In infants peeling may be very slight. In young adults with greasy skins very little may be seen on the surface of the body; but in two or three weeks the skin of palms of hands or soles of feet may peel in shreds or flakes. The earliest sign of desquamation is usually found on the face, which looks as if it had been powdered a little. It may be coarse and best seen on the eyelids, about the mouth and ears. At the end of the first week little branny scales may be seen on the trunk, and before the end of the second week peeling has become general. The feet and hands are the last to peel, and this may not be complete before the end of the fourth week, although it may continue for six or eight weeks or longer.

The fauces and throat first show vivid red, rather uniform, injection, with slight œdema of uvula and swelling of the tonsils; after a day or two the tonsils may be more or less covered by an exudate which sometimes spreads to the fauces and uvula; in other cases there is a superficial necrosis or ulceration of the tonsils, which in septic cases is very marked; the muscles are interfered with, and swallowing toward the end of the attack may be impossible.

In these cases a purulent discharge from the nose is the rule.

The throat signs may exist for some days before the rash occurs. The tongue often presents a very characteristic appearance; at first it is very thickly coated with a white fur; it then becomes in a very short time denuded of this white fur, and in

from twenty-four to forty-eight hours may show a red, raw appearance with hypertrophy of the papillæ resembling a ripe strawberry. In mild cases the appearance of the tongue is not as marked.

In no other throat conditions do we find the raw, clean appearance of the tongue at any stage.

In septic attacks the tongue during the second week again becomes coated. In some cases the tongue does not completely peel, but there is a whitish, irregular strip down the centre.

The glands of the neck under the angle of jaw are almost always somewhat swollen, and in septic cases the whole neck may be swollen, and feels brawny. The neck may be very tender, and in some cases suppuration may occur and sloughing takes place; these cases are almost always fatal.

The temperature usually rises rapidly with the invasion, and reaches its climax about the fourth day; it usually ranges between 103° and 105°, and its subsequent decline is gradual. In the septic form the fever keeps up and goes on for two or three weeks. In malignant cases apyrexia is sometimes seen.

Very mild cases, although accompanied by a well-developed rash, may not be accompanied by fever.

The pulse is usually unduly *frequent* in the early stages.

The nervous system is seldom much affected. In young children the attack may be ushered in by a general convulsion. Delirium is occasionally present at the worst of the disease; in the bad cases of septic nature it may be of the muttering type during the second week; with this, picking at the bed-clothes and involuntary evacuations may be seen.

The bowels are constipated except in very bad cases there may be diarrhœa toward the end.

The skin is usually very dry, but sweating, especially of hands and feet, is common after peeling.

The urine in the beginning is rather scanty and high colored, and often contains a trace of albumin.

Nephritis is a common complication and shows characteristic urinary changes.

Irregular cases of very mild form may occur without fever, characteristic tongue or eruption, but, as a rule, one of the features is more or less marked.

Scarlet fever nurses may suffer with slight attacks, chiefly

affecting the throat. Surgical cases in wards are sometimes attacked mildly, and are seemingly more susceptible.

Pregnant women are more susceptible, and at the time of parturition the disease is often fatal.

The diagnosis of scarlet fever is often exceedingly difficult when the symptoms and rash are irregular. Acute pharyngo-tonsillitis may show throat changes which cannot be distinguished from those of scarlet fever; if to this is added an erythema of neck and chest the difficulties are very great. The absence of vomiting, the non-punctate appearance of the rash, its rather fleeting character and less uniform appearance, and absence of desquamation, in time will probably clear the case up. The tongue never shows characteristic changes.

When throat symptoms appear early, with a false membrane, it is quite impossible to distinguish it from true diphtheria without a throat culture; here, too, an error is possible, so that in many cases the appearance of the rash is absolutely essential to confirm the diagnosis.

German measles may have a very similar rash, although it is usually found on face and forehead. The presence of enlarged glands behind the ear and in the occipital region, with the absence of much disturbance of throat or change in the usual febrile tongue, usually makes the case clear.

Smallpox may have an initial rash, erythematous and punctate in nature, but it is apt to be confined to the groins, axilla, and abdomen. The severe pain in the back and the absence of throat and tongue symptoms are valuable in making the diagnosis of smallpox.

Gastric disturbance with an erythematous rash and febrile movement is perhaps the most difficult affection to tell from scarlet fever. The throat often looks injected too. One must rely on the appearance of the tongue and the absence of desquamation.

Complications are very important.

Otitis media is the most frequent; it occurs in about 10 per cent. of the cases; it is infrequent after fifteen years of age. It is most common between the third and seventh day, but in septic cases may occur later. It is often mild, with slight, bloody, purulent discharge, clearing up in a few days; or severe, with discharge for some weeks. The intense pain in ear, deafness, injected and bulged drumhead make the diagnosis.

Mastoiditis may occur before, but more frequently after, the drumhead has been perforated.

The glands under and back of ear may suppurate in these cases.

Slight inguinal adenitis often occurs early, and is of diagnostic importance.

Cervical adenitis occurs in most of the cases. The cervical glands, either under the jaw or in front or behind sternomastoid, may enlarge and suppurate during convalescence. The temperature rises and keeps up until pus is formed and discharged. This complication occurs, as a rule, between the second and fourth weeks.

Articular rheumatism, better called scarlet fever arthritis, producing swelling, pain, and tenderness in many of the small joints, is not infrequent. It is more common in rheumatic subjects. Affections of the heart do not often accompany it. The joints may suppurate and pyæmia result. It is more common in young adults than in children.

Nephritis occurs in about 5 per cent. of the cases. Transient albuminuria can hardly be looked upon as nephritis, but persistent albuminuria, even without constitutional symptoms, must be regarded as nephritis. The occurrence of nephritis in the early stages is not frequent; it is more a complication of convalescence and may occur as late as four weeks. Cases vary greatly in intensity. In many cases there is moderate suppression and considerable blood in the urine. Dropsy and anæmia are frequent symptoms. Chronic nephritis does not often result.

Eczema of the face and scalp are not infrequent.

Ulcerative stomatitis is not frequent; it occurs around the gums and the inner surface of cheeks; the teeth may fall out and large, sloughing areas be produced. Strumous children are most frequently affected. Bronchitis is a rare complication. Post-scarlatinal diphtheria is not infrequent during convalescence in children confined to institutions which are liable to diphtheritic infection.

## SMALLPOX.

**Smallpox** is an acute infectious disease accompanied by an eruption, which is usually at first papular, then vesicular, and finally pustular.

Of late years great interest has centred in this disease because

it has been prevalent over most of the world in epidemic form, being, however, kept under control by the efficiency of vaccination.

The susceptibility of the unvaccinated is almost general, the immunes being only about 5 per cent. or less.

In temperate climates it is more prevalent in the fall and winter.

Its contagiousness is very powerful, and few susceptible to the disease escape if brought into a room containing a smallpox case, unless ventilation is very good.

Incubation varies from five to twenty days; it is usually about twelve days.

The onset is sudden, with headache, chill, or pain in the back; the backache may be very severe and extends down the thighs and legs. Headache and backache usually last until the eruption appears. Epigastric pain with vomiting are often early and severe symptoms. Anorexia and thirst are always present; the tongue is usually coated white. Pallor is often marked, but sometimes the face is flushed. Most patients are restless; some are delirious in the early stages. Children may become comatose. The temperature is sudden in its onset and rises quickly; it may reach 104° the first or second day; sometimes it reaches 107°. It remains high until the eruption appears. In adults the pulse is about 110 or 120, and in children about 150. The respirations are hurried. The prodromic period lasts two or three days. In some cases the prodromata are quite mild. During the prodromata there may be initial rashes which are either erythematous or hemorrhagic. Erythematous rashes are either general or partial; they usually cover the trunk and limbs, but there may be areas quite free from the rash. They reach their height in about twenty-four hours, and last from two to four days; they may disappear as the papular eruption comes out, or not until later. This eruption is less punctate than that of scarlet fever, and not so bright. It is not accompanied by faucial inflammation and the tongue is not peculiar. The cervical glands are not enlarged. In hemorrhagic cases a diffuse rash may cover the body; it looks like the flush of erysipelas; it may continue throughout the case or fade when the characteristic eruption appears.

In some cases the erythema is partial and found chiefly on the flexor surface, but it may be found on the extensor sur-

face of extremities only; it usually disappears as the regular eruption occurs, but in some cases it only makes its appearance then.

Hemorrhagic rashes may appear on the first, second, or third day; they are either petechial or petechial with erythema. The site is almost always on the lower part of the abdomen and inner surface of the thighs; occasionally the rash is seen over the lumbar region, axilla, or chest, or on the flexor surface of joints. The color is either bright red or purple; it looks like a continuous red surface, dotted in places with purple petechiæ. As the rash grows older the purple tint becomes deeper.

In some cases reddish petechiæ alone are present; they may be found on the abdomen, chest, and flanks; sometimes they are limited to the groins and flexor surface of the extremities.

Sometimes a rash scattered all over the trunk and extremities occurs, which looks like simple purpura.

The petechial and erythematous rashes develop fully in about three days; they are not raised and do not itch; they are sometimes accompanied by hemorrhages from the mucous membrane.

The *characteristic* eruption appears, as a rule, about forty-eight hours after the initial symptoms, but there are many exceptions to this course; there may be a few papules before, or they may not appear for three or four days. The forehead, face, back of arms, wrists, and hands usually show the first appearance of the eruption, but it may appear everywhere almost simultaneously.

The mucous membrane of the mouth is affected about as soon as the skin. The abdomen and chest, as a rule, are affected the least. The extensor surfaces are usually more affected than the flexor. Where the erythematous or petechio-erythematous rashes occur the common eruption is seldom found. As a rule, the papules keep on coming out for three days unless the disease has been modified by vaccination, when they may all come out in one day.

The eruption at first consists of bright-red papules which disappear on pressure, but become raised and hard in about twenty-four hours. At the apex of the papule a little vesiculation is seen which increases in size slowly, getting wider at the periphery day by day until, about the fifth or sixth day of the eruption, it is a fairly complete vesicle surrounded by a zone of red; it may be translucent or opaque, looking like a

dull pearl; the centre is sometimes depressed. If pricked, serum exudes, but it does not empty and collapse.

About the sixth day the apex becomes yellowish; this extends toward the periphery daily, the central depression becoming elevated, and about the ninth day of the eruption there is a dome-shaped pustule with an angry base or areola, which is now greater than at any period. About the eleventh day the pustule may burst or become crusted or inspissated; if the crusts come off, the surface is red, elevated, and sometimes ulcerated. The vesicles of mucous membranes become pustules, but they are smaller than those of skin and have very little base; they usually break and show an irregular, rather ragged surface, which, if confluent, in the throat may resemble diphtheria.

The skin eruption always presents a very irregular development of the rash; often papules, vesicles, and beginning pustules are seen together. During pustulation a musty, mousy odor is usually present.

The temperature is high during the prodromata, but when the eruption appears it usually falls and may be normal on the third day of the eruption, but usually is about 99° or 100°. When pustulation begins the fever rises and may reach 104°. The fever goes on until the end of the pustulation, usually higher in the evening and lower in the morning; its duration depends on the degree of skin inflammation.

The pulse corresponds to the fever and to the severity of the disease; during pustulation it may become weak and irregular.

With the growth of the vesicles and pustules the whole skin and subcutaneous tissue begin to swell, the eyes may be closed, and the extremities may pit.

Thirst may be excessive. Salivation is common and the mouth often cannot be closed; swallowing is difficult, although vomiting is not frequent, and food is well taken.

The mind is usually clear in mild cases, but in alcoholic cases or when the disease is severe delirium may be very marked. In bad cases symptoms increase after pustulation and death usually takes place between the twelfth and sixteenth day.

**Modified smallpox** occurs in cases which have been vaccinated, and such cases are now more frequent than the type described. The course of the eruption is usually greatly changed and the symptoms so modified that it is much more difficult to recognize the disease. The whole eruption, as a rule, comes out within

twenty-four hours and the vesicles are formed in three days; many of the papules abort and fade.

The size is smaller than the ordinary eruption and much more irregular in size and development; they are more conical and not often depressed in the centre. After about the fourth day of the eruption the vesicles become opaque and dry up; if they become pustules they do so at about the sixth day and soon dry up.

The initial symptoms are not severe, and within a few hours after the eruption appears the temperature falls to normal and often remains so.

There are scarcely any complications. There may be a few boils, erysipelas, or conjunctivitis.

There are cases of smallpox met with that often present or show a particular type, and these types one should be familiar with.

1. **Cases without eruption** may occur in those who have been vaccinated. There are initial symptoms and sometimes an erythema, but no eruption or further signs. Such cases may convey the disease.

2. **Discrete smallpox** shows the eruption pretty well scattered all over the body; the eruption is all out in twenty-four hours and it runs a slightly faster course than the ordinary variety.

In cases which have been vaccinated a few vesicles may appear in different parts of the body. The author has seen a small crop near upper lip looking something like herpes; a few may be found on forehead, back of neck, or wrists. Vesiculation takes place very quickly and the course is short. In rare cases of discrete smallpox, whether vaccinated or not, severe nervous symptoms occur. There may be delirium, convulsions, or coma. Very few of such cases recover.

3. **Confluent smallpox** is almost always severe, but in some of the cases the eruption is only confluent in certain areas, but generally the face, chest, abdomen, and back may be almost covered. The swelling of the skin with œdema is very marked. The skin is very uncomfortable. There may be intense itching. During the pustulation the fever is very high. The mortality is about 50 per cent.

When a person has been vaccinated the confluent form is greatly modified. The vesicles may run together and their heads become opaque, but instead of going on to severe pustulation

they dry up, becoming brown in their centre. These cases are never fatal.

4. **Hemorrhagic smallpox** may take place with or without the ordinary eruption.

(*a*) BLACK SMALLPOX is the name given to cases which present no ordinary eruption, but the hemorrhage occurs in spots or patches on the skin and on or from the mucous membranes or kidneys. There may be in addition general or partial erythemas. The temperature is usually low or may be normal or subnormal. The mind is clear. Backache is severe. Retinal hemorrhage with blindness may take place.

These cases always end fatally.

(*b*) VESICULAR AND PUSTULAR HEMORRHAGIC SMALLPOX either show hemorrhages from the mucous membranes and into the skin, with a marked ordinary eruption, or the hemorrhage takes place in the skin under the vesicle. In both classes of cases recovery is the exception.

While the above groups are good types, it does not seem possible to describe the manifold groupings and irregularities which may disguise the eruption of smallpox.

Complications are common.

Abscesses into the skin and subcutaneous tissue are the most frequent complication. Cellulitis and erysipelas are not infrequent during the pustular stage.

Conjunctivitis is frequent, especially in the confluent cases; ulcers on the conjunctiva are not infrequent.

Keratitis is not rare in the severe cases. Otitis media is not frequent.

Laryngitis with much swelling or obstruction in the glottis is common in severe confluent cases.

Bronchitis is always found in severe cases.

Lobar pneumonia and empyema are not uncommon during the suppurative stage.

Pyæmia and septicæmia may occur in rare instances.

Pitting, keloids, alopecia, pigmentation are frequent sequelæ.

**Diagnosis** is often very difficult, especially during the initial symptoms.

At that time the onset may resemble any number of acute infectious diseases, but in the absence of any known epidemic one often thinks of scarlet fever. The first symptoms may be the same in each before the eruption occurs. In scarlet fever

the occurrence of marked throat signs, submaxillary adenitis, and furred tongue with large papillæ are helpful, while in smallpox backache may be a prominent symptom. If there is an erythematous eruption in smallpox it has not the punctate appearance, and if the eruption is irregularly scattered on the limbs without much on chest, neck, and groins, it is more likely smallpox.

Measles may resemble smallpox in its early stages; the eruption appears later; there is not so much backache; there are more catarrhal symptoms. The early spots are smaller and the eruption spreads less rapidly and is not much raised and is not shotty or vesicular.

Typhus may show similar initial symptoms; the rash does not appear on face and does not resemble it.

Influenza may resemble smallpox before the eruption appears; if an erythematous rash occurs there may be great doubt until the third or fourth day, but there can be none after the eruption appears.

When the rash is developing or developed a number of rashes may be mistaken for smallpox.

Measles, when severe, may look like the papular stage of confluent smallpox; in both cases the skin is swollen and the eyes may be suffused. In smallpox the papules are more raised, vesiculation is beginning to appear at the top of the papule. There is a shotty feeling on the forehead and about the wrists. On the mucous membranes small, white, vesicular spots are seen in smallpox.

Chickenpox is more frequently mistaken than any other disease in this stage. In chickenpox initial symptoms are rarely present, and the fever is never much.

The eruption is most abundant on the trunk and sometimes on scalp; it is less on the face, arms, and legs, and hardly appears on the hands and feet. It usually appears in crops.

In chickenpox the papules become vesicular within a few hours; many are oval or circular in shape; they are unilocular and collapse when pricked. When pustulation occurs, as is often the case in unclean subjects, umbilication is more marked, the pus can easily be emptied by pricking, and the covering cuticle is very thin.

In chickenpox the papules and vesicles on the arms are usually or at least sometimes very tough and look like those of smallpox,

but on the body some vesicles of typical appearance can usually be found.

Pustular syphilis may resemble smallpox, but the absence of acute symptoms, much fever or vesiculation, and the history of chancre usually make the diagnosis easy. Throat appearances in syphilis may be characteristic. Herpes, eczema, glanders, prickly heat, iodism, acne lichen, pemphigus, papular urticaria have all been confounded with smallpox, but a careful study should leave no room for doubt between these forms of eruption.

## CHICKENPOX.

**Chickenpox** is an infectious disease, occurring chiefly in children, characterized by a vesicular eruption which appears in successive crops.

Incubation is from eleven to nineteen days. Prodromata are usually absent; children may be fretful, lose their appetite or vomit, and have a little fever a few hours before the eruption appears. In rare instances fever may be high; there may be a convulsion or delirium. Hemorrhagic cases with bleeding from the mucous membranes, hæmatemesis and hemorrhage from the bowel or into the skin, with collapse and subnormal temperature, have been seen.

The eruption usually attracts the first attention. It sometimes appears all at once, but in most cases crops come out with intervals of a day or two for six or ten days; the second and third crops are usually most abundant. It first appears on back, abdomen, and chest, but occasionally on face and limbs; the abundance of the eruption varies; in most cases the eruption might be considered sparse, but occasionally the whole body and sometimes the face is covered with the eruption. The scalp is a favorite site for a few vesicles.

The eruption at first appears in irregularly shaped, rose-colored macules which soon become slightly raised papules; in many cases there is considerable body to the papule, and some of the smaller ones may appear hard and shotty. Vesiculation is not general, as many of the macules and papules fade. The time of vesiculation varies from a few hours to a day or two, and when the eruption is in crops the eruption is seen at all stages. The vesicles may be round or oval with dome shape, not umbilicated, filled with serous fluid which escapes on being

pricked. There is often a pink or red areola, which may be quite large on the trunk. Circular vesicles vary from size of a pin's head to a split pea; oval vesicles may be larger. Most of the vesicles become ruptured and dry up, but they may desiccate without rupturing.

The fluid in the vesicles may become quite cloudy and sometimes pustules form, but, as a rule, the serum becomes infected.

In cases that do have pustules a little serum escapes from the apex of the vesicle; the rest of the fluid becomes purulent and the pustule presents an umbilicated appearance. The duration of the disease varies from five to twelve days.

Fever is usually absent, but a temperature of 102° is not very infrequent.

Itching is the greatest discomfort.

In very unhealthy children the skin may become gangrenous and death results from septic infection.

In hemorrhagic cases recovery is the rule.

Complications are rare. Bronchitis and pneumonia may occur. Nephritis has followed the disease.

Chickenpox may occur with measles, scarlet fever whooping-cough, and diphtheria.

## TYPHOID FEVER.

**Typhoid fever** is an infectious disease caused by Eberth's bacillus and is characterized by inflammation of Peyer's patches and a train of symptoms due to the local inflammation, toxic absorption, and complicating inflammations in divers situations owing to secondary infection by the same micro-organism or a different one. Incubation is from four to twenty-one days.

The course of the disease is subject to great variation, and the diagnosis may be correspondingly difficult. The majority of cases run a fairly straightforward course of about four weeks' duration.

During the first week there is an increasing fever, higher in the afternoon and evening and lower in the morning; there is headache, malaise, anorexia, sometimes nausea and vomiting; the bowels are usually constipated, although diarrhœa is not infrequent. Slight epistaxis is frequent.

During the second week the fever has usually reached its greatest height, 104° or 105°, and is fairly steady; the morn-

ing temperature may be as high as the evening, although it is apt to be very slightly lower.

At the beginning of the week a slight eruption may appear; this eruption consists of small, rose-colored spots a little larger than a pin's head; slight elevation is perceptible; pressure causes them to disappear; they are first seen on the abdomen, chest, and back, appearing almost one at a time and seldom becoming numerous; in some cases no rash is seen, while in others the trunk and extremities may be fairly spotted. The rash comes out in fresh spots during the second and sometimes going on through the third week.

The spleen is usually palpable at the beginning of the second week; in some cases with muscular resistance percussion discovers enlargement when palpation fails; the spleen may never be enlarged enough to percuss or palpate.

The enlargement continues during the second and third week, although it may get smaller at the end of the second week.

During the second week the symptoms are due to the high fever and toxæmia, causing restlessness and delirium in many cases, and from the intestinal condition, which usually produces tympanites, constipation, or marked diarrhœa, with the "pea soup" appearance of the movements.

Intestinal hemorrhage may occur and, in rare cases, perforations.

The third week resembles the second, but in bad cases severer symptoms develop and in mild cases there is usually improvement.

The fever is not as steady; it may run up higher or sometimes drop a degree or two without much apparent cause.

Complications are much more frequent. Intestinal hemorrhages and perforation are more liable to occur.

The fourth week usually shows a constantly declining temperature with evening increase and morning remissions, the morning striking normal some days before the evening reaches that point. There is a corresponding improvement in all the symptoms. Severe cases may show a continuance of the symptoms of the third week, or they may be even more severe and fatal.

Mild cases may become convalescent in the fourth week.

The above is a short summary of the usual course of typhoid, but in making the diagnosis one must have knowledge of all

the possible ways in which typhoid manifests itself from the onset to its termination.

The onset is, in most cases, very regular; there is headache, lassitude, anorexia, and perhaps an occasional epistaxis with increasing temperature, often profuse sweating and sudamina, but occasionally the onset may be sudden and misleading.

(*a*) It may resemble an ordinary cold with repeated shivers, headache, and pains in the bones.

(*b*) Symptoms of tonsillitis or pharyngitis may be well marked.

(*c*) Pneumonia may occur at the onset, the typhoid symptoms being masked at first and only recognized when the lung begins to clear up.

(*d*) There may be vomiting and severe epigastric pain, with every appearance of acute gastritis, but the fever keeps up after the gastric symptoms have abated, and other positive signs usually occur.

(*e*) Cases which come on suddenly with severe headache, vomiting, delirium, photophobia, and stiffness of neck resembling meningitis; these cases are more frequent in children.

(*f*) Acute nephritis may occur at the onset and mask the typhoid.

(*g*) There may be a harsh, husky, irritating cough, and hoarseness which resembles laryngitis.

**The course** of the disease is very variable, and among the irregularities there are certain types which can be classified:

1. The abortive form comes on with pronounced symptoms and runs a course of ten days or two weeks, clearing up rather suddenly or gradually; relapses may occur.

2. The Ambulatory Form.—The symptoms are not severe enough to make one go to bed, but such cases may be liable to a sudden lighting up of symptoms or to intestinal perforation.

3. Mild cases run a course of about three weeks, the temperature seldom reaches 104°, and there is very little prostration.

4. Cases which run a course without any fever, although other well-marked symptoms may be present; epidemics of this type have been seen.

5. Grave forms, with very severe cerebral symptoms, hallucinations, and occasionally convulsions or persistent vomiting of bilious matter or great weakness of heart, profuse diarrhœa, stupor, and muttering delirium.

6. Typhomalarial form, in which malarial paroxysms may occur with considerable enlargement of the spleen; in some cases the fever is not influenced by the malarial complication, although the plasmodium may be present.

7. Old Age Type.—The symptoms are not usually severe in old people; headache and fever are complained of. Mortality is high from heart-failure or pulmonary œdema or pneumonia.

An analysis of the symptoms of typhoid is necessary to arrive at a correct diagnosis owing to its many possible ways of developing.

The fever shows many variations from the regular type described; the occurrence of certain complications during the disease has a marked influence on the curve. Intestinal hemorrhage if marked or perforation is almost always followed by the fall of a degree or two; sometimes it goes to normal, but quickly reacts. Pneumonia and malaria may send the fever up quite sharply.

Some cases have prolonged fever for perhaps seven or eight weeks, owing to the slow healing of the ulcers of the intestine.

There are cases without fever.

During convalescence there is great susceptibility to a rise of temperature, especially when there is much anæmia or great nervousness; fever may occur suddenly and last a day or, perhaps, three or four without apparent adequate cause, which may be perhaps constipation, intestinal fermentation, or excitement.

Some cases keep running a very slight fever for weeks without being made sick by it; they may not get over the fever until they are gotten up and about.

Relapses occur in from 5 to 10 per cent. of the cases; in these cases fever plays a very important part, as other symptoms are seldom severe. Most cases occur between ten and fourteen days after cessation of fever, but a shorter period or even one as long as six weeks is sometimes seen.

The pulse usually is of fair force, and in men may range under 100 and in women under 120 throughout the disease; a slow pulse compared with the fever in the early stage is rather significant of the disease; the quality is soft and often dicrotic. A small, frequent pulse is always a bad sign. The occurrence of hemorrhage or perforation is always followed by a great increase in the frequency of the pulse.

A pulse slower than normal has been seen throughout the disease.

The tongue in the beginning is usually coated with a white fur, especially in the centre, the tip and edges being red; after the first week it becomes dry and brownish; later this may become dark brown, almost black and crusted, while the gums and lips are often covered with brownish, sticky material called sordes. As convalescence sets in the tongue becomes clean and moist. It may be moist throughout the disease.

The stomach may be upset at first; there is nausea and anorexia; these usually disappear after the first week. In some cases, and when nephritis is present, vomiting may be very marked.

Diarrhœa when present is one of the special features of typhoid; it may be present throughout, but usually comes on during the second and third week; the stools usually look like pea-soup; their number in twenty-four hours is from four to twelve.

Constipation is more frequent than diarrhœa.

Intestinal hemorrhage occurs in about 3 to 7 per cent. of the cases. It usually occurs during the third week, occasionally before and not infrequently in the fourth or fifth. Small hemorrhages produce tarry stools, but no constitutional symptoms; large hemorrhages show clear blood in the stools; there is a fall of temperature from two to five degrees, frequent heart action, pallor, and faintness; immediately fatal hemorrhages are rare, but bad hemorrhages increase the mortality.

Tympanites is almost always seen, especially during the second and third week; when excessive it produces discomfort and some embarrassment of the heart's action.

Intestinal perforation occurs in about 2 to 3 per cent. of all cases; it is more common in adults than in children and more frequent in males. It occurs more often during the third and fourth weeks, but also at other periods, more often later than sooner. The signs are those of perforative peritonitis; pain is usually sharp, though sometimes absent; there is almost immediate tenderness, which increases; vomiting and abdominal distention and general peritonitis are soon manifest. Absence of liver dulness from escaped gas is frequent; this is not always so and may be due to tympanites. There is almost always a fall of temperature, quickening of the heart, and some shock or

collapse, but the cases differ very much in these symptoms. Recovery occasionally takes place without but more often with operation; most of the cases are fatal.

**Complications** are very numerous and often serious; many of them seem due to additional outside infection and some come from the typhoid bacillus itself.

The skin may show the so-called maculæ cæruleæ, or tâches bleuâtres, appearing on the abdomen; these may be caused in some cases by pediculosis. In the weak and debilitated, small, purpuric spots may be seen. Sudamina, urticaria, and erythema are not infrequent. A rash resembling measles is sometimes seen. Boils are very frequent. Subcutaneous abscesses are not infrequent in those who have been tubbed. Bed-sores are not often seen in well-nursed cases. Loss of hair is very frequent during convalescence.

Thrombosis of the femoral vein, more commonly the left, is not infrequent during the latter part of the disease or during convalescence; there is local pain, swelling of the leg, and a slight rise of temperature.

Obliterating arteritis may affect a large or a small trunk; local pain, a cord-like feeling of the artery, œdema of the extremity, and, at times, dry gangrene may occur.

The larynx may be affected with catarrhal inflammation; ulcerations of false cords, epiglottis, surface of arytenoids with perichondritis and exfoliation of cartilage, followed by stenosis, rarely occurs.

Paralysis of the vocal cords has been seen during convalescence, due to muscular or nerve changes from the toxins or from pressure on the recurrent laryngeal by enlarged glands.

Bronchitis is common at any time in the course of typhoid.

Bronchopneumonia is infrequent; suppuration and abscesses may occur in the focal points.

Lobar pneumonia may be an early complication and mask the typhoid symptoms; it may occur at any period; it is caused, in most cases, by the pneumococcus of Fraenkel, but Eberth's bacillus may be the cause of consolidation. Pleurisy and empyema are infrequent.

Tuberculosis may follow typhoid fever from the susceptibility of a weakened constitution.

In the mouth cancrum oris has been seen in children; the side of the cheek may be destroyed by gangrene; recovery is very rare.

Parotitis is sometimes seen late in the disease or during convalescence.

In the pharynx ulcers have been occasionally noticed.

Otitis media is not infrequent.

In the liver cholangitis and the formation of abscesses have been known.

Empyema of gall-bladder and phlegmonous cholecystitis are very rare complications.

Nephritis may occur early in the disease, but it is not a frequent complication.

Albuminuria of mild type is very frequent in the acute stage of the disease; a few hyaline casts are often found; it disappears during convalescence.

In acute nephritis considerable blood is found in the urine in some of the cases; more often there is little blood, but considerable albumin and many casts; it usually comes on in the second week; recovery usually takes place; but it may increase, and uræmia causes death.

Suppurative nephritis is sometimes seen. Nephritis occasionally is a sequel.

Pyelitis and cystitis are rare complications; orchitis, epididymitis, ovaritis, and salpingitis have been seen.

The nervous system may be profoundly affected; in the severe stage of the disease delirium is almost the rule; sometimes there may be convulsions, stiffness of neck, and retraction of head. During and after convalescence the mind may be affected with different forms of insanity; in most cases recovery takes place after many months.

Neurasthenia is a frequent sequel.

Poliomyelitis has been seen; occasionally there is peripheral neuritis affecting both the upper and lower extremities, but a plexus of nerves or one nerve only may be affected.

The bones are frequently affected during convalescence; periostitis not uncommonly affects the tibia or femur. The joints may be inflamed early in the disease; pain and swelling of the ankle, wrist, knee, and smaller joints may come on early in the disease; the symptoms subside during convalescence.

Curvature of the spine may occur after convalescence.

Osteoarthritis is sometimes seen.

Septic arthritis may rarely be seen.

**The diagnosis** of typhoid fever can seldom be positively made before the end of the first week; the things of most value in the diagnosis are the course of the temperature, the enlarged spleen, rash, and general appearance of dulness and sick look.

Epistaxis, occurrence of diarrhœa, and tympanites have considerable value. Every effort has been made to find some certain sign which may be positive in the early stage or in atypical cases.

The diazo reaction of Ehrlich was once hailed as of great value; it is seldom found before the end of the first week; it is present in about 75 per cent. of the cases; as the reaction is found in most acute infectious diseases, as scarlet fever, smallpox, and acute miliary tuberculosis, its value in critical diagnosis is almost *nil*. Widal reaction, which is the change produced upon typhoid bacilli in culture by adding the blood of the case to be tested, which has been diluted ten to forty times with neutral bouillon; examination under the microscope will show in typhoid cases that the bacilli instead of being active tend to become slow in their movements and clump together. This reaction is seldom seen before the seventh day, but it has been seen as early as the fourth, but in the majority of cases if obtained its occurrence is later than the tenth day. The purity and efficiency of the original culture, difficulty of technique, and the frequency of the absence of this reaction render it of very uncertain value in diagnosis. Its positive occurrence, however, is certainly of great value.

The detection of the typhoid bacillus in the stools is very difficult, and as they are seldom found before the ninth day there is little practical value in it.

Detection of the bacillus in the blood from the eruptive spots or general circulation is possible, but not very practical.

It has been clearly shown that we cannot hope to make a positive diagnosis of typhoid fever in its early days, and that there are many early complications which for the time completely mask the disease, and that there are atypical cases which for some time defy diagnosis. The knowledge of these facts must ever be before us in order to guard us against serious errors.

There are a number of diseases which may simulate typhoid.

Septic conditions, puerperal fever, and malignant endocarditis

may produce symptoms like typhoid; in some cases there are rashes and enlarged spleen, but this is not often.

Acute trichinosis may be very confusing; there is usually the initial history of vomiting and diarrhœa; the fever curve is less regular; no rash or enlarged spleen. There is a great increase in the eosinophiles of the blood in most cases.

The occurrence of pneumonia, or nephritis at the onset has already been spoken of as masking the disease.

Typhus fever is at present a very rare affection. The onset is more acute and fever more continuous; the rash appears earlier; it consists of larger, more irregular spots which come out almost simultaneously and persist to the end of the disease; they are pinkish, become brownish, and do not disappear on pressure. The fever disappears on the fourteenth or twenty-first day by crisis.

Acute general miliary tuberculosis is sometimes very confusing; the temperature curve may be less regular, there is more rapid emaciation and sweating, there is no enlargement of spleen, and seldom any rash; the abdomen is not distended, the pulse is quicker, and the patient is not so dull; the tongue seldom gets brown and dry early in the disease.

Tuberculous peritonitis with some abdominal tenderness and distention may easily be mistaken for typhoid; the spleen is not often enlarged; there is seldom the facies or expression of typhoid, and the temperature curve is less regular; the formation of fluid or masses may be the first sign to rule typhoid out.

The gastrointestinal form of epidemic influenza has more acute symptoms, with higher fever in the beginning, and is sooner over; the two diseases may occur together.

**Paratyphoid.**—Under this name are grouped a class of cases which run a febrile course somewhat similar to typhoid, but, as a rule, milder and seldom, if ever, fatal. A reaction, in nature similar to the Widal, is obtained with varieties of the paracolon bacilli, of which the bacillus of Gaertner is most commonly employed.

The spleen is not enlarged, as a rule, and there are no eruptions.

The Widal reaction is not obtained. At the present time the clinical and bacteriological entity of the disease has not been clearly established.

## TYPHUS FEVER.

**Typhus fever** is an acute infectious disease, occurring at the time of war, famine, or destitution.

The period of incubation is about twelve days, but may be three weeks and sometimes less than twelve days; during this period there are seldom symptoms, but there may be malaise or headache.

The onset is almost always sudden, with slight chilliness, great weariness, and insomnia. The expression soon becomes dull; the facies is flushed, dusky, or leaden in hue.

These symptoms last for four or five days, when the rash appears; with the appearance of the rash the patient is more nervous, wakeful, and delirious; the tongue grows dry and the mouth and teeth are covered with sordes. The rash resembles that of measles, but is rarely seen on the face; it appears about the armpits or the wrists and on the sides of the abdomen. The trunk and extremities are soon almost covered.

The spots are irregular, somewhat purplish; the skin between the spots is mottled. The trunk is always purpuric. At about the tenth day the patient either shows some improvement or the nervous system seems much stupefied by the severity of the poison, and there is extreme prostration; the heart is very weak; cerebration may be altogether lost. The pupils are contracted. The tongue is dry, shrivelled, and cracked. Defecations are involuntary. Twitchings of muscles of forearm, producing subsultus tendinum; spasmodic twitchings of the face; picking at the bed-clothes is a common symptom. With the appearance of these grave symptoms the rash becomes darker and does not disappear on pressure; it is like a purpura.

In many of the cases the above symptoms are followed by a more direful condition. The pulse becomes almost imperceptible; there is the so-called "coma vigil," which may last for hours or days, and the patient dies from exhaustion.

Sometimes death is due to œdema of the lungs, pneumonia, or uræmia. In the majority of cases the symptoms are never as severe, and on the fourteenth day the disease ends by crisis.

The temperature in typhus ordinarily rises suddenly at the beginning, reaching the maximum height, 103° to 105°, between the fourth and seventh day.

At the beginning of the second week there is a slight remission,

lasting two or three days and then increasing to the crisis. In a small number of mild cases the fever ceases at the end of the first week. In very severe cases at the end of the first week the fever becomes higher and more persistent. In some cases the fever gradually declines through the second week. In the great majority of cases the fever drops suddenly to normal on the fourteenth day.

Fatal cases are usually accompanied by high fever from the outset, and just before death there may be hyperpyrexia.

Afebrile typhus occurs in rare cases.

A characteristic odor with poisonous emanations proceed from the skin and breath during the second week. The skin is often affected with sudamina, urticaria, and herpetic vesicles. During convalescence there is a furfuraceous desquamation of the skin. The hair may fall out. The heart is usually profoundly affected by the disease; it is usually quite frequent, although at times it is slow. Weakening of the heart usually begins about the fifth day, but after the tenth day its strength begins to improve in favorable cases. When the heart begins to fail there is weakened apex beat and feeble first sound; the first sound may fail altogether. In extreme cases hardly any sound is heard and there is marked tachycardia.

The breathing is often altered; it may be irregular and spasmodic, or the mouth may be closed and the cheeks puff in and out; the nostrils may be dilated. There may be Cheyne-Stokes respiration. Bronchitis is not infrequent, and in bad cases hypostatic pneumonia is found.

The urine is concentrated, often contains albumin. Nephritis is not infrequent in severe cases. Uræmia with convulsions occurs occasionally, being almost always fatal.

The nervous system is almost always profoundly affected in typhus fever; delirium is frequent, it is usually mild and muttering, but extreme violence from delirious excitement and delusions may take place.

Muscular weakness or loss of nerve control is often seen in the sphincters and sometimes in the muscles of eyelids, which may prevent them from closing. There may be inability to protrude the tongue. Tinnitus aurium is frequent early in the disease; deafness occurs in many cases, later, whether from otitis media or loss of central activity is not always known.

Complications are not infrequent.

Hemorrhages into the skin and from the mucous membranes are not uncommon. Pyæmia may affect the joints and lung with abscesses.

Thrombosis of femoral vein is frequent. Arterial thrombosis and embolism may occur. Diarrhœa and dysentery are sometimes seen. Jaundice occurs occasionally; most of these cases are fatal. Bed-sores are not infrequent.

Differential diagnosis is seldom difficult; there is no rash which looks like typhus, and it is almost always present.

Before the rash appears the initial symptoms may be puzzling. They resemble relapsing fever as closely as any other disease, but, of course, the prevalence of either epidemic is of help in the diagnosis.

When the disease has run a week the nature of it could never be in doubt, but as in many cases of diagnosis it is the lack of sufficient or correct history which causes confusion. The examination of the blood will always clear up the diagnosis between typhus and relapsing fever.

Purpura, because of the eruption, may resemble typhus, but the lack of fever or characteristic constitutional symptoms is quite enough to distinguish it by.

Measles has a brighter, less hemorrhagic rash; there is catarrhal inflammation of nose and eyes. The mouth may show characteristic changes.

Other diseases, such as typhoid and smallpox, may possibly be confusing under peculiar circumstances.

## MALARIAL FEVERS.

Malaria is a specific infectious disease, caused by the hæmatozoa of Laveran. There are different types of the disease dependent on variations in the form and growth of organisms.

It occurs most frequently, and in some of its forms exclusively, in tropical and semitropical regions. It is seldom seen above the 45th parallel of latitude in this country.

Negroes are less susceptible than whites.

The period of incubation of the regular malarial fevers is from ten to twelve days; in the irregular types from three to five days. In some cases the disease never seems active, but after years anæmia and enlargement of the spleen may be found.

In other cases the change from a malarious district to a non-

malarious region or another country may be the occasion for an active manifestation of the disease.

Regular malarial fevers have two types, tertian and quartan.

**Tertian Fever.**—This is the most frequent form in temperate regions. In the single tertian the paroxysm occurs at the end of forty-eight hours; in the double tertian at the end of twenty-four hours, the so-called quotidian form.

**The quotidian** type is the more frequent when quinine has not been administered, but when quinine is taken in insufficient doses the quotidian generally becomes tertian.

**Quartan fever** is quite rare in temperate climates.

The malarial paroxysm is divided into three stages—the cold, the hot, and the sweating.

The cold stage begins with lassitude, uneasy sensations in the epigastrium, at times with nausea and vomiting.

A rising temperature occurs with the first symptoms. Very shortly there is a sensation of coldness, the face becomes bluish, shivering takes place, soon followed by a violent chill. The surface temperature is below normal, but the rectal temperature may be 105° or 106°. The pulse is small and frequent; the head aches. The duration of the chill is from twenty minutes to an hour and sometimes longer.

The hot stage is ushered in by flushing of the surface; the skin becomes hot and dry; the pulse is large and strong; the head aches terribly. The temperature is seldom higher than during the height of the chill. Delirium is sometimes present at this time. The hot stage lasts from one to four hours.

The sweating stage follows, with profuse general perspiration and amelioration of all the symptoms.

The duration of the whole paroxysm is about twelve hours, and this is very uniform. The recurrence of the paroxysm is about the same hour daily in double tertian, and every other day in single tertian. Succeeding paroxysms either anticipate the preceding or occur at a later period. Malarial paroxysms seldom occur at night. Between the paroxysms the patient usually feels fairly well, but malarial patients are apt to suffer from symptoms of gastritis or of diarrhœa.

Anæmia is almost always present in any case, but in long cases is very severe. The tongue is coated white, looks pale, and the edges are often indented. The heart may show hæmic murmurs. The spleen can almost always be felt or found

increased in size on palpation. It certainly is rare not to discover enlargement of the spleen.

**Irregular malarial fevers** are most common during the latter part of summer or in the autumn. These forms are caused by a parasite which appears somewhat changed from the ordinary. Crescentic and flagellate organisms are the most common. The term æstivo-autumnal is given to these types.

(*a*) IRREGULAR INTERMITTENTS with longer duration of the paroxysms, which either approach each other or coalesce, thus at times producing a pseudocrisis; most of these cases are quotidian or have paroxysms occurring during a continuous fever.

(*b*) REMITTENT MALARIAL FEVER begins with a violent chill and is followed by a continuous fever with remissions or slight intermissions. There may be marked gastric symptoms. The symptoms often suggest typhoid. The duration is from seven to sixteen days. Some cases show severe symptoms with delirium. At the beginning the acuteness of the fever and the already enlarged spleen almost rule out typhoid, although when the case has not been followed the examination of the blood is altogether necessary for diagnosis.

(*c*) PERNICIOUS MALARIAL FEVERS are rare in temperate climates, but are not infrequent in the tropics.

The comatose form is one in which sudden delirium followed by coma takes place. Chills may precede the attack with fever at first, although the temperature may become subnormal. Death usually occurs quickly.

The algid form shows severe gastroenteric symptoms with diarrhœa, the temperature is usually subnormal, the pulse is weak, and death usually occurs.

Hemorrhagic malarial fever may be the form seen in very severe malarial infection of any variety. The hemorrhage may be into the skin and mucous membrane or from the kidneys; death may follow from suppression of the urine.

**Malarial Cachexia.**—When a patient has had repeated attacks of malaria without proper treatment, or in some cases when one has lived in a very malarious district, even without having paroxysms, there may follow a severe anæmia and great enlargement of the spleen; the liver, too, may be enlarged.

The red blood cells may be reduced to 1,000,000. The leukocytes are usually diminished.

In the milder cases a change of climate with good treatment may restore health, but in many cases enlarged spleen and anæmia are always present.

**Complications and Sequelæ.**—Dysentery is frequent, especially in the South.

Typhoid fever may occur concurrently.

Pneumonia is not rare.

Cirrhosis of the liver may follow severe and long-continued cases.

**Diagnosis.**—Ulcerative endocarditis, pyæmia, cholangitis, and abscesses may all have chills followed by fever, but in malaria the regular duration of the paroxysm is about twelve hours; they seldom occur at night; the spleen is usually enlarged; malarial organisms as a rule, are found in the blood. Quinine always controls the paroxysms.

In the malignant cases cholera and typhus may be thought of, but the examination of the blood usually determines the diagnosis.

## WHOOPING-COUGH.

**Whooping-cough** is a very infectious disease, occurring chiefly in children, characterized by a spasmodic cough with laryngeal spasm and catarrhal inflammation of the air passages. The time of greatest susceptibility is between two and five years.

Incubation is from four to twenty-one days. The disease begins like an ordinary cold in the chest; there may be a little fever, some malaise, with a rather distressing cough, especially troublesome at night. A few sibilant or sonorous rales may be found in the chest. These symptoms go on for one or two weeks and sometimes longer before the diagnostic sign occurs. This feature is a violent fit of coughing, which allows of no inspiration; the child gets cyanotic and may vomit, and then follows a deep, difficult inspiration through a larynx not fully relaxed, producing a loud, brassy, crowing sound; these phenomena may be repeated again and again, each time the child's face first becoming red, the eyes suffused, and sometimes bulging, the features swollen and at last dusky, until finally the child sinks back exhausted, wet with perspiration, with eyelids swollen, conjunctiva red, and sometimes showing hemorrhages on the sclera. The child often vomits after the fit of coughing, and

sometimes the bowels move involuntarily. Excessive vomiting may interfere rather seriously with nutrition.

The severe congestion of mucous membrane from coughing may produce hemorrhage from the nares.

In young children with sharp incisors the frænum of the tongue becomes chafed and ulcerated, forming at times an ulcer the size of a ten-cent piece; this is never seen before the spasmodic stage. The duration of the disease is from three to ten weeks. There is a great difference in the severity in different cases.

Complications may be serious.

The condition of the stomach and bowels may be very bad; vomiting and sometimes severe diarrhœa may reduce the child very much. In these cases the temperature may rise considerably. Convulsions are not infrequent; as a rule, the cause is the heightened sensibility of the nervous centres, but they may presage the severe complications of bronchopneumonia, thrombosis of cerebral sinuses, or collapse of lung. Cerebral hemorrhage may result from the violent straining, and result in paralysis, aphasia, and impaired intellect. In young infants collapse of the lung in whole or part may follow a severe paroxysm and result fatally, almost immediately or sometimes after several hours. It will be seen that the intercostal spaces are sunken; there is absolute lack of expansion, with frequent shallow inspirations. The end may be preceded by a fit. After two years of age collapse of the lung is very infrequent, but severe bronchitis or bronchopneumonia or lobar pneumonia are not infrequent and often are fatal.

Sequelæ are not infrequent.

Tuberculous adenitis, acute general tuberculosis, pulmonary tuberculosis, chronic bronchitis, asthma, and emphysema may follow severe cases.

The diagnosis in the early stages before the whoop can seldom be positively made, but severe cough, especially at night, without physical signs should make one very suspicious.

## MUMPS.

**Mumps** is an acute infectious disease producing inflammation of the parotid gland, and frequently of the testicles, mammary glands, and ovaries. It is most frequent between the ages of four and fourteen.

The period of incubation may be from fourteen to twenty-five days. Prodromata are usually fever and malaise; occasionally there is a chill. In a few hours swelling appears at angle of jaw over the parotid region; there is some stiffness and discomfort, but rarely much pain. The swelling varies, sometimes it is very great; the lobe of the ear is pushed outward and the face looks very much wider. The skin over the gland is usually pale, but may be a little pinkish. The swelling reaches its height in a few days, remains stationary for a day or two and slowly declines, being normal in from ten to twelve days. If one gland is affected, a little later than the other, as is often the case, or, as sometimes happens, after one side has subsided, the duration of the disease is prolonged. On account of difficulty in swallowing, saliva may collect in the mouth, although sometimes the mouth is dry from diminished secretion.

In adults especially the genital glands may be affected. In males orchitis may occur as soon as the parotitis is seen, but usually occurs later in the disease and sometimes during convalescence. With this may be prostration and vomiting. The orchitis lasts for some days and may be followed by atrophy of the testicle.

Meningitis has been known to complicate mumps. Peripheral neuritis and optic neuritis are rare sequelæ.

Mastitis in females is seldom very serious. Ovaritis is hard to prove. Deafness may result from otitis media or disease of the labyrinth.

## SYPHILIS.

**Syphilis** is an infectious disease which plays a more variable and important role in the field of diagnosis than any other disease. The real nature of the virus is unknown, but the affection is produced by direct inoculation, which results in the formation of a sore called the initial lesion or a chancre, or by indirect communication in three ways: first, a syphilitic fœtus from a syphilitic father inoculates its mother while *in utero*. In these cases the mother shows no secondary manifestation and rarely tertiary, but sometimes there do occur true syphilitic manifestations after a considerable period; these subjects are immune to regular syphilitic inoculations; second, a previously healthy fœtus may be infected by a mother who acquires syphilis while carrying the child; third, a child may be born syphilitic

because either the ovum or spermatozoa was syphilitic at the time of conception.

Direct contagion almost always shows a sore at the point of infection, but this point cannot always be discovered. The most frequent points of infection are on the genital organs, lip, fingers, nipples, anus, eyelids, but a chancre may occur at any point if infected by syphilitic virus. The period of incubation of a chancre is three to five weeks. The most characteristic point about a chancre is induration; there is no tendency to ulceration unless there is mixed infection. Induration is not always present.

Enlargement of the proximal glands is always present; they are firm, not large, and do not suppurate unless there is mixed infection. The duration of the chancre is from three weeks to two months.

**Secondary Symptoms.**—A rash or constitutional symptoms show from one to three months after the appearance of the chancre; the average time is six weeks. Its most common form is a macular roseola, pinkish or copper-colored. It is most abundant on the trunk; it is more common on the front of the extremities; it may develop about the forehead to some extent, but is seldom marked over the rest of the face. The eruption may be papular, scaly, pustular, or bullous. It reaches its height in from two to three weeks and lasts from six weeks to two months. In some cases the eruption is scanty, fleeting, or wanting.

When the eruption is at its height, slight ulcerations of kidney shape are often seen on the tonsil; there may be no ulcerations, but the mucous membrane looks whitish in patches of irregular shape, not larger than a small bean. Such patches, called mucous patches, may show on tongue or cheeks. These patches and ulcerations last from three weeks to several months, depending on the treatment. On moist surfaces, as around the vulva, anus, and inner surfaces of thighs, the skin may become elevated into small, flattened nodules called condylomata. These may occur at any time during the secondary or tertiary stage, and are largely due to uncleanliness; however, they are much more frequent during the first six months. Iritis may occur about the time of the decline of the eruption; it is usually bilateral; there is usually free effusion of lymph occurring in elevated, salmon or rust-colored nodes; there is much ciliary congestion;

there may be a deposit in the posterior layers of the cornea. Retinitis may occur at about the same stage; there is dimness of vision, and the retina is hazy. Iritis seldom occurs at any other stage, but relapses may occur in an adherent iris, and then there is seldom much exudation of lymph.

The patient usually loses flesh, has a little evening temperature; appetite is poor. The bones or joints may ache and be tender. The hair may become thin in small patches. Secondary symptoms are usually over in six months, but may be seen for eighteen months in bad cases. It is often impossible to separate the stages.

**Tertiary Symptoms.**—These appear as a rule some time after two years, but they may never occur or may occur at a most remote period from the time of the secondaries. There are some symptoms that occur off and on through the secondary and tertiary period that are not at all characteristic of either period, and do not seem necessarily due to active syphilitic virus, but are manifestations due to impaired tissue function. Among such are aphthous patches on tongue or throat. Scaly eruptions, chiefly seen on the hand, called psoriasis palmaris.

After a year or eighteen months, perhaps later, a relapse of the secondary symptoms is sometimes seen; the eruption may be very severe, pustular, or having the form of rupia.

As a rule, when treatment has been thorough, tertiary lesions do not manifest themselves.

The most frequent tertiary symptom is periostitis of the long bones, especially the crests of tibia; also of the skull, sternum, ribs, and clavicles. Arthritis is not uncommon.

The skin is often affected; there is less tendency to symmetry in tertiary lesions than there is in secondary.

The most common skin lesion is scattered annular or serpiginous, nodular, slightly elevated, coppery-colored areas which advance on the edge, heal in the older areas, and leave pigmentary spots. Syphilitic ulcers are very frequent. Eczema is not uncommon. The formation of *gummata* is frequent and may affect the brain, skin, bones, liver, and other internal organs.

Tendencies to chronic productive inflammations and degenerations are seen in the internal viscera, nervous systems, as in tabes dorsalis, also in the bloodvessels, resulting in the production of aneurysms, sclerosis, rupture. Eye lesions may occur; optic neuritis is not infrequent.

The regular course of the disease is often interfered with by certain conditions. Idiosyncrasy may render a subject immune or may result in very severe poisoning by the virus. One attack generally makes a person immune, or the disease may occur in abortive form; there may be a sore and no secondaries. A well-developed second case can occur. Those who are affected congenitally have a certain degree of immunity.

**Congenital syphilis** behaves somewhat differently from acquired syphilis. The secondary and tertiary lesions often appear together, but this is not the rule. As a rule, there is a rash which is more eczematous, generally appearing on the buttocks, feet, and hands; the skin may look reddish or copper-colored, resembling a burn which did not blister, but looks as if the first congestion had disappeared. The rash usually appears from two weeks to one month after birth; there is a discharge from nostril, the bridge of the nose at the base is apt to sink, and the root of the nose seems broad. The child becomes shrivelled and looks old. Iritis is not infrequent.

Many children cheat this period. If they recover they are healthy until tertiary manifestations show. These children are liable to nodes on the skull and long bones and gummata and interstitial inflammation of the internal viscera. They are more liable to serous inflammation. Severe anæmia may occur at any time and cause death.

Among tertiary lesions symmetrical keratitis is not uncommon; it is especially striking because it is seldom found in acquired syphilis. Otitis media may occur and cause deafness.

The lymphatic glands in tertiary syphilis in children may enlarge in groups or singly and break down, but it is a remarkable fact that glands are practically never found to be enlarged adjacent to syphilitic ulcerations of skin or mucous membranes.

The hereditary syphilitic physiognomy is told by the sunken bridge of the nose; the skin around the angles of mouth is often marked by little pits or linear scars. The frontal eminences are often protuberant. The incisor teeth (of the second teeth) are apt to be stunted, jagged, or notched; they are often narrow and peg-like. The upper incisors are most characteristic, and these alone are often affected, but the other teeth may share in the deformity. Vertical notches and grooves are more characteristic than transverse grooves. The teeth are by no means always affected. The cornea may show slight evidences of past keratitis,

In general it may be said that the tertiary lesions of congenital syphilis are not as severe as the acquired, and there is a tendency for the disease to wear itself out.

## LEPROSY.

This is an infectious disease due to a specific bacillus which produces pigmentary changes in the skin, neoplasms of the skin, mucous membrane and nerves, causing nodules and disturbances of sensation, tissue degeneration, ulcerations, progressive contractions, and destruction of extremities. It is distributed very irregularly in different portions of the globe; it is certainly more common in hot climates, but epidemic centres are not uncommon in cold climates, as in Norway, Russia. In temperate climates it possesses very little contagious element and generally is not segregated in such climates.

Three varieties are described: (1) the nodular or tuberculous; (2) the smooth or anæsthetic; (3) the mixed. It is very seldom that anæsthesia is not present to some extent in the nodular form, and the anæsthetic form usually develops nodules in time.

**The Nodular Form.**—At the outset there may be constitutional symptoms such as headache, malaise, rigors, profuse perspiration, but very often no symptoms are present. The first characteristic appearance is a slightly raised, irregular, shiny, erythematous-like patch of reddish or copper-colored tint in whites, but in black or dark races there is not much change in color. Hyperæsthesia may be present at first. The parts affected are usually the lobes of ear, alæ nasi, malar prominences, forehead, eyebrows, root of nose, lips, and chin. It may appear on the thighs and buttocks later. The eruption may persist, decrease in size, or in some cases disappear, but after a time constitutional symptoms again occur and another crop of eruption appears. This may happen several times before papules appear; these may enlarge to the size of a pigeon's egg. They usually appear at the site of the first eruption, but may occur at some other point. In time masses form; in whites they are shiny and reddish-brown and in blacks they are darker than the surrounding skin. Bloodvessels may be seen under the skin or the orifices of sebaceous cysts on the surface of the nodules.

After varying lengths of time other parts of the body may be affected in a similar way; thus the lesions are found over the

trunk; the scalp is rarely affected. The mammary gland and penis may be involved. Sometimes the nodes coalesce and form masses. Occasionally small subcutaneous nodules are felt. At times there is diffuse infiltration of the skin. The eye may be affected by the growth, the conjunctiva and cornea may be infiltrated, and the eye changed to a shapeless mass, the sight being lost. The mucous membrane of the nose may be thickened, affecting voice and breathing. Nodules may be found inside the mouth, on the pharynx, and laryngeal mucous membrane. In time the nerve trunks become infiltrated and the sensation of the skin is lost. The nodes may cease to grow or even diminish in size; the skin, however, is thickened and there is anæsthesia. The face may acquire the leonine expression, the eyebrows become prominent, and the skin furrowed. The cheeks may be puffed out and pendulous. The ears may be enormously enlarged.

In most cases the growths increase in size by attacks and the parts become much enlarged; the feet may be greatly enlarged and covered with masses. The nails drop off and horny pegs take their place. In young males the testicles never develop; when the disease is acquired after puberty the testicles atrophy.

Women are not usually sterile, but their children are puny.

After an uncertain time ulceration finally sets in, especially on the exposed parts; there may be great loss of tissue; sometimes healing takes place, but, as a rule, the ulcers keep on increasing in size. The patients live in this state for months and years, finally dying from exhaustion, tuberculosis, or nephritis.

In other cases the ulceration takes on a phagedenic form, large sloughs form and the patients die of pyæmia and sepsis.

In the **anæsthetic form** there are not always constitutional disturbances, but there may be feeling of chilliness and malaise. Pains and burning sensations are often felt in the ulnar and perineal nerve; there may be hyperæsthesia in the parts which they supply, the pains are often absent, and the first sign may be numbness in the hands and diminished power; accidental burns and wounds may take place.

Sometimes maculæ are the first symptoms noticed; these spots may first be erythematous or pigmented, or there is lack of pigment. The spots are light brown or copper-colored, in blacks they may look brown; their sizes are one or two inches in diameter. The eruption usually appears on the shoulders,

back, loins, buttocks, thighs, knees, and elbows; the face often escapes. After a time contractions of the fingers take place, especially the fourth and fifth fingers. After one or two years the spots begin to enlarge, the centres lose their pigmentation and become anæsthetic. The hairs fall out, the patch becomes wrinkled, and sweat glands are destroyed. The border becomes raised and a little nodular and is reddish-brown in color; sometimes there are vesicles or pustules.

Desquamation is always taking place. There may be scabs. The areas coalesce; their border may be serpiginous. The face may become invaded and the white patient may resemble a negro or mulatto. After a time the disease ceases to advance and may remain stationary for years. In the majority of cases destruction of tissue continues, severe contractions take place in the fingers, interossei and muscles of thumb atrophy, and there may be wrist-drop. Atrophy of the muscles of the leg takes place in the later stages. The last stage is ulceration, occurring especially in the extremities; necrosis may affect the bones and gangrene is often severe. These conditions are for the most part painless, although in some cases there are severe neuralgias. Suppuration may occur in the tendon sheaths. Bed-sores may be found on the buttocks. Ophthalmia is frequent, as well as ulceration of the cornea, pannus, and iritis.

**Mixed leprosy** is frequent; there may be nodules at first and these disappear; anæsthesia follows. Anæsthesia followed by nodules is rare.

# CHAPTER XXI.

## DISEASES OF THE PERIPHERAL NERVES.

### PERIPHERAL NEURITIS.

This affection is due to some form of poison, mechanical cause or circulatory disturbance, which affects the peripheral nerves. There are several different types.

I. The mixed type affects both motor and sensory nerves.
II. Motor paralysis without sensory disturbance.
  (*a*) Spasmodic variety.
  (*b*) Paralytic variety.
  (*c*) Atrophic variety.
III. The sensory type.
  (*a*) Sensory symptoms exist almost alone, with some muscular weakness.
  (*b*) Sensory symptoms, with muscular inco-ordination.
IV. The vasomotor type.
V. Peripheral neuritis due to pressure or cold.

#### I. Common or Mixed Multiple Neuritis.

This form is almost always occasioned by excessive amount of alcohol, or from arsenical poisoning, beriberi, or diphtheria.

**Alcoholic neuritis** is usually insidious; at first the symptoms are mainly sensory; pricking or tingling sensations in the fingers or toes, with more or less numbness; the hands and feet may feel as though covered by a glove, or as if there was something soft interposed between the feet and the ground. There may be tremor or twitchings of muscles. Cramps in the muscles are frequent. Sometimes there is aching in the limbs or lancinating pains in the hands, arms, feet, or legs. There may be sensations from the visceral nerves, as gastralgia, intestinal colic. In some cases there may be marked hyperæsthesia of the skin of arms and legs; the weight of the bed-clothes may be intolerable. Squeezing of the calves elicits great pain. In many cases

anæsthesia is more or less marked. There may be loss of temperature sense. Tactile sensations are usually well preserved. Cutaneous anæsthesia and muscular hyperæsthesia may go together in advanced cases; in early cases they may exist at separate times. Numbness and tingling are early symptoms. Anæsthesia is very variable; in some it is marked and in other cases altogether absent.

Muscular weakness and paralysis usually come on gradually, although occasionally they are rather sudden.

The use of thumb and forefinger are apt to be first affected, then the extensors of wrist and flexors of ankle, and thus we get wrist- and foot-drop. The grasp of the hand is affected, and the fine movements of fingers used in buttoning are greatly impaired. The triceps is apt to be more affected than the biceps, so the elbows are flexed. As a rule, the deltoid, biceps, and supinator longus are not severely affected, although they are in some cases. In the lower extremity the foot cannot be raised. The big toes are usually hyperextended, which is a rather characteristic feature in early cases.

The anterior muscles of leg are much affected. The extensors of thigh are more often affected than the flexors. All the muscles which are affected undergo marked atrophy, and in some cases nothing but bone appears left. The walk is very characteristic; the toes cannot be raised, so flexion at the knee with flexion of the thigh is most marked when walking. The muscles of back and abdomen and neck are sometimes affected, so that there is difficulty in raising the body. The flaccidity of the abdominal muscles may prevent good expulsion of bladder or bowel contents and produce a pendulous condition. The diaphragm is occasionally affected, showing retraction of the epigastrium and increased action of the lower intercostals. Muscles of the face are rarely implicated to any extent; there may be feebleness with tremor of lips, flat appearance of face, and slight difficulty in closing the eyes. Tremor and weakness of tongue may make the articulation thick and indistinct. Phonation may be weak.

Muscles of the eye are seldom affected, but ptosis, strabismus, nystagmus, and rarely the Argyll-Robertson pupil are seen.

Ataxy is never present, although the weakness of the muscles may make the movements somewhat uncertain and jerky, yet the sense of position and co-ordination is never lost.

The sphincters are not affected, but if delirium or other psychical disorders are present the bladder or bowels may be emptied involuntarily.

If the mind is normal, dysuria and retention are rarely seen.

Loss of reflexes, especially the knee-jerk, is always found and is a valuable sign. In the earliest stages the knee-jerks may be present or even exaggerated. The cutaneous reflexes are usually present. Electric reactions show those of degeneration in well-established cases, but in the early stages the reactions are either normal or very slightly changed.

The extremities often feel hot and burning. Their color is usually bluish or purplish when dependent, but when elevated are usually white. Sweating is sometimes marked, but dryness is more common in the late stages and the skin becomes covered with scales of drying epidermis.

The nails and hair become dry and brittle. The joints may be very tender, and in some cases red and swollen without being caused by rheumatism.

Œdema may be a feature in some alcoholic cases with degeneration and dilatation of the heart; this œdema may be capricious, affecting the trunk or upper extremities or scrotum to a greater degree than the legs, but this is not generally the case.

Psychical symptoms are frequent in alcoholic cases; oftentimes there is a marked forgetfulness for passing events. Slight or violent delirium is by no means infrequent.

The onset is rather gradual in most cases, but sometimes there is sudden loss of power. It usually takes several weeks for the case to reach its maximum intensity; then there is a stationary period of about two months, followed by improvement, which may take six months before being complete. In some cases contractions of tendons, atrophy of muscles, and chronic thickening of the joints may last permanently. In many cases insanity and dementia succeed the paralysis.

Tuberculosis frequently affects these subjects.

**Arsenical Neuritis.**—The signs of a well-established case closely resemble the alcoholic form. The lower extremities are generally affected first; atrophy seems to take place faster. The extensors are much more markedly affected than the flexors. There are no psychical affections. Recovery almost invariably takes place.

**Beriberi.**—The signs are like the peripheral neuritis of alcohol and arsenic, but there is much greater liability for the pneumogastric and phrenic nerves to be involved.

**Diphtheritic Neuritis.**—The extremities may be affected as in the foregoing examples, but, as a rule, the early symptoms affect the palate and larynx or ciliary muscles; the spread of the paralysis is slow and the loss of power is not absolute; there is not much wasting; there is more tendency to inco-ordination; the knee-jerks may be present; bulbar crises with aphonia, dyspnœa, vomiting, and death are occasionally seen.

### II. Motor Paralysis without Sensory Disturbances.

(*a*) **Spasmodic Variety.**—Cases with inability to move muscles, accompanied by muscular spasm due to peripheral inflammation of the nerves, have not been clearly established, but it is generally believed that tetany may be an example of just such a condition. A description of tetany is found under Rickets. In addition to rickets being the occasion, it is sometimes seen in dilatation of the stomach with excessive secretion of hydrochloric acid in adults. It is also seen occasionally after extirpation of the thyroid gland.

(*b*) **Paralysis without Sensory Symptoms.**—*Lead palsy* seems to be an example of this condition. In this affection the extensors of wrist and fingers seem to be almost exclusively affected; there is no pain or sensory disturbance. In lead poisoning the deltoid, biceps, and supinator longus and brachialis anticus may occasionally be the seat of the paralysis. In both cases a degenerative neuritis seems to be the cause. Localized motor neuritis is sometimes due to alcohol, influenza, and typhoid.

Widespread motor neuritis affecting the muscles of extremities and body without sensory disturbance may be almost impossible to distinguish from anterior poliomyelitis, but it is believed that such cases do exist and may be caused by lead poisoning, diphtheria, and influenza.

*Acute generalized motor paralysis* is usually described under the term of "acute ascending paralysis" or "Landry's paralysis." This term is given to cases in which there is general paralysis, rapid atrophy of muscles, followed in most cases by death, but sometimes by recovery; all of such cases, however, are not due to neuritis, but it is seldom that the distinction can be made clinically.

It occurs between the ages of twenty and forty more often in men than in women. Exposure to cold may be the cause, but the infectious diseases, syphilis, alcohol, and tuberculosis are more frequent causes.

The invasion may be sudden or gradual, with tingling, formication, and paræsthesia preceding the paralysis for several weeks; pains in the limbs are sometimes present. Gastralgia and diarrhœa may occur. Anæsthesia may precede the paralysis; the extremities may be cold and livid. Sensory symptoms are seldom marked.

The lower extremities are usually affected before the upper; the finer movements are disturbed before the coarser. In about one-half the cases the muscles supplied by the cranial nerves are involved; there may be difficulty in swallowing or talking; food may regurgitate through nose or enter the larynx. The tone of voice and phonation may be changed. Paralysis of the facial and ocular muscles has sometimes been observed. The diaphragm may be affected, generally, before the intercostal muscles; death may be due to the involvement of both.

In rapid cases there is little atrophy of the muscles, but in more chronic cases there is atrophy and the reaction of degeneration to electricity.

The reflexes are quickly lost.

Retention of urine and obstinate constipation may occur; in a few cases there is incontinence of urine and feces, but the former may be due to a distended bladder.

Fever is seldom present unless toward the end. The pulse becomes fast toward the end. The mind is seldom affected. The disease begins at the extremities of the limbs, the lower usually first, and then ascends, attacking the muscles in order. The muscles last affected are those of the pharynx and larynx.

The fatal cases usually die before the tenth day, although many go on for four weeks. Cases have died before forty-eight hours.

Asphyxia from paralysis of the muscles of respiration is the most frequent cause of death. A few cases end in recovery.

(*c*) **Peripheral Neuritis with First Atrophy and then Loss of Function.**—This type is seen in the small muscles of hand and is designated as the Aran-Duchenne type. Atrophy is the marked feature, the loss of power increasing with the atrophy. Lead poisoning may be a cause, but the most frequent cause

is overfatigue, and is most frequently seen in cooks and sewing women. There may be a sense of numbness or pricking in the muscles and fingers; but pain is unusual.

Another form affects the peroneal muscles chiefly, and is called the Charcot-Marie form of amyotrophy. It seems caused by a specific poison and may occur after measles; it may affect several members of a family.

The lower extremities are first affected, and, perhaps only, but after an interval of one or two years the muscles of hand and forearm are affected. The muscles of thighs and arms may be affected later. Slight fibrillation of the muscles may be seen. Reflexes are usually lost. There may be pains and cramps in the limbs. The true nature of this disease is not fully known, but changes in peripheral nerves and posterior columns of cord, showing inflammation and degeneration have been found.

### III. The Sensory Type.

(*a*) Patients often complain of feelings of numbness and tingling in the fingers and toes; they may be severe enough to disturb sleep. The tips of the fingers may be found less sensitive. The first dorsal interosseous muscle may be tender. In alcoholic cases there may be hyperæsthesia in a number of muscles. The knee-jerks are variable. The fingers may move with slight difficulty. Such cases are probably due to a slight neuritis and may be occasioned by alcohol, dyspepsia, diabetes, gout, pressure, and overuse.

(*b*) There may be another type in which the sensory symptoms are accompanied by muscular inco-ordination.

Such cases may be combined neuritis with tabes dorsalis, or the muscular inco-ordination may be present without locomotor ataxia; in the latter group one may consider writers' cramp, and cases which follow diphtheria, measles, and other acute diseases occasionally.

### IV. The Vasomotor Type.

Under this heading we must place a condition known as Raynaud's disease, in which there are three stages: first, the stage of local syncope, in which the parts are pallid; second, of local asphyxia, in which lividity may occur in paroxysms; third, the stage of local gangrene.

The fingers, toes, tips of ears or nose may be affected. In

the straightforward cases we have attacks of local pallor and coldness due to tonic contraction of the vasomotor nerves; if in the extremities their sensibility is blunted, but there may be severe pains; motor power may be weakened. The color changes may be due to change in the atmospheric temperature.

After some time the vessels relax and there is local congestion from cyanosis, and, finally, gangrene from disturbed innervation. Peripheral neuritis has not been found in all cases of Raynaud's disease, but the connection has been established in some cases.

The cause is unknown, although gout and syphilis have been considered to have some connection with it.

Young subjects are more often affected than older people.

### V. Paralysis Due to Neuritis from Pressure or from Cold.

The most common variety of *pressure paralysis* is due to lying on the arm, to certain positions during anæsthesia, and from crutches, the musculospiral being compressed. The extensors of wrist and supinator longus are affected, producing wrist-drop and loss of supination.

There may be numbness and tingling over the distribution of the nerve.

Recovery takes place in from three to six weeks.

**Facial Paralysis.**—This is commonly called "Bell's paralysis." The cause is almost always from cold, but other causes are otitis media, traumatism, and syphilis.

The diagnosis is easily made almost at one glance. The paralyzed side is smoother and the mouth pulled a little toward the other side with the mouth drooping on the well side. If the facial muscles are tested the eye may not close; the eyebrow and forehead do not wrinkle, and on whistling or laughing the mouth is pulled toward the well side. When the facial nerve is affected within the middle ear deafness may result, but when the nerve is affected which leads to the stapedius muscle, if there is no otitis media present there may be acuter hearing, especially to musical sounds.

Facial paralysis due to cortical and subcortical lesions may be very difficult to tell from the peripheral variety; the chief distinction is the slight involvement of the orbicularis palpebrarum and the ability to close the eye in the former; the oculofacial group may be very much weakened, however, in many

cases. In the cerebral form, although voluntary movements are paralyzed, emotional movements may occur.

Double facial paralysis is sometimes caused by the poison of diphtheria or double otitis media.

Fig. 12

Unilateral facial palsy. Patient unable to close eye of the affected side. (Dercum.)

## NEURALGIA.

It is doubtful whether neuralgias are ever simply functional; it is probable in most every case there is some actual neuritis, although, even by microscopic examination, few cases are possible to prove. The underlying cause of neuralgia is usually some constitutional affection, as anæmia, rheumatism, gout, or malaria. Sudden changes of temperature or a local draught are the most frequent causes of neuralgia.

**Sciatica.**—This is one of the most common forms of neuralgia. In these cases the pain is usually more or less constant, but in some cases it may be stabbing and paroxysmal. Stretching the nerve usually causes great pain. Tender points are usually found where the nerve is least protected. In time muscular atrophy may take place from disuse, and the limb actually becomes shorter from the position in which the leg is held in order to ease the pain. Double sciatica is rare, although it is not unknown and may occur in diabetes.

**Facial Neuralgias.**—These forms are very common, but according to causation have very different courses.

**Tic Douloureux, or Epileptiform Neuralgia.**—This affection has a definite course; it may begin in the lower jaw behind the canines, in the upper at the roots of any of the teeth, or in the infraorbital or supraorbital notch. The paroxysms are terrific, as though one was struck by painful lightning or an electric wave which runs along the nerve and perhaps branches to others. The fifth nerve alone is affected in the beginning, though other nerves may participate later. In most cases paroxysms are less frequent at first and may affect one at a certain time of the year only, but the paroxysms may become more or less continuous, though less severe. A draught, eating, laughing, or talking may be the cause of a paroxysm.

The subjects are usually healthy and without neurotic tendencies. The disease occurs most frequently between forty and fifty. The affection is very persistent. Very little change is discovered on examination of the nerves microscopically.

**Neuralgias Due to Organic Lesions of the Trigeminal Nerve or its Roots.**—Such cases may be caused by tumors; these are not infrequently found at the root of the fifth nerve; in most cases there is some anæsthesia of the skin; gummata may be the cause. Injury of the skull may produce pressure by bone or by a clot of blood.

**Neuralgia Minor.**—These are chiefly the frequent, simple affections caused by cold or by an inflamed tooth; many cases suffer with pains over the supraorbital or infraorbital notch or in the teeth. In these cases pain may be referred to some part not in any way affected, as pain in the ear due to condition of molar teeth. Defects of vision, iritis, etc., may be the cause of neuralgia minor. Suppuration of the middle ear or inflammation of the drum without perforation may produce severe neuralgic pains back of the ear or below it, even after the inflammation has subsided.

Inflammation of the frontal sinuses may produce severe neuralgia at the base of the nose.

Diseases of abdominal organs and lungs may be the cause of reflex, temporal, orbital, occipital, or parietal neuralgias.

Intercostal neuralgia is not infrequent. Neuralgia of the lumbar and cutaneous abdominal nerves is infrequent.

Persistent neuralgia following herpes zoster is of frequent occurrence.

# CHAPTER XXII.

## DISEASES OF THE SPINAL CORD AND MENINGES.

### COMPRESSION OF THE SPINAL CORD.

THE causes of compression may be from affections originating in the bones or from growths of the meninges or cord itself.

Tuberculous inflammation is the most frequent cause of the former; in such cases the compression may be due to an abscess which destroys the bones and presses backward on the cord or from a productive caries. New-growths may arise from the bone or periosteum and penetrate the spinal canal.

Traumatism may produce fracture of the vertebræ or displacement of the intervertebral disk or hemorrhage. Aneurysms of the descending aorta may erode vertebræ and produce pressure. Echinococcus cysts in the posterior mediastinum or in the back part of the abdomen may erode the vertebræ and cause compression of the cord.

The symptoms and signs of pressure on the spinal cord are very numerous, but a very thorough study of them may enable one to localize the trouble very accurately.

Deformity of the spine may be seen in some cases of tuberculous caries, fracture, dislocations, and new-growths. In some situations, as about the sixth cervical vertebra or in the lumbar region, fracture or tuberculous caries producing marked pressure symptoms may occur without showing any deformity. Great deformities from tuberculous caries may exist without producing any pressure symptoms, but in fractures there may be much pressure without deformity, and it is believed the pressure effects may have been caused at the time of the injury, and the bones may have sprung back in good place later. In destructions from new-growths the cord symptoms may be sudden from giving way of the spinal column at some particular time.

Tenderness about the region of inflammation or new-growth is very frequent. Application of a hot sponge may produce

great pain. The spine at the point of trouble may be stiff and immovable.

It is not uncommon to find some of the spinous processes shortened as a result of congenital defects.

Pain is one of the most important of all the symptoms in tumor compression, although it may be absent in other cases. At first there may be steady aching; afterward there may be stabbing paroxysms; these pains may be caused by motion. Pain may be due to pressure on the nerve roots and be referred to the extremities. Pain is never referred to any point above the lesion, but pain is often not sufficiently definite to localize the tumor unless there be pressure on certain nerve roots, and this is less often than pain from pressure on the cord itself, which usually refers the pain to a point lower than the tumor.

As a rule, the centres below the pressure point are more irritable; so that reflexes are increased and there is spasticity of the muscles. In severe compression or severance of the cord the muscles may be paralyzed and reflexes disappear immediately, but if death does not take place some activity with reflexes may return.

If the compression is above the second dorsal vertebra, the pupil of one or both sides may be dilated.

Compression above the sixth dorsal vertebra may cause acceleration of heart's action from irritation of the accelerator nerve fibres of the heart.

Paralysis of the intercostal muscles is sometimes seen if the compression is as high as the second dorsal vertebra. The centres for the diaphragm and its nerve fibres are higher up, and these are seldom affected.

Vasomotor constriction of the bloodvessels may be seen in cases of long-standing pressure. In acute cases there may be vaso-dilatation and the paralyzed limbs may be swollen and flushed; these symptoms may be marked at the joints, and this may resemble arthritis.

The splanchnic nerves may be affected, producing tympanites; the large intestine may be very sluggish. In lesions in the sacrum the sphincters may be paralyzed.

The bladder is usually affected; at first there may be retention due to spasm of the sphincter vesicæ. In gradual pressure there is loss of power and incontinence.

Lesions in the lumbosacral region may diminish the amount of urine secreted. In cases of severe compression, especially intramedullary, there is apt to be severe disturbance of nutrition of the skin; bed-sores form easily.

The site of the lesion is most important to determine.

The exact seat of a transverse severance can be told by observing the lowest muscle which can be affected by voluntary action; this can be accurately determined in the limbs, but not in the abdomen and chest.

The exact area of skin anæsthesia must also be determined, and these points can then be compared with the areas of the motor and sensory centres of the cord.

The areas of analgesia must also be determined, because this is some clue to the amount of cord destruction, as these tracts lie in the central gray matter of the cord.

The position of the nerve centre must be determined by analyzing systematically the exact site of the loss of muscular power, the areas of skin anæsthesia and of analgesia, reflexes, pupillary conditions, heart action, respiratory movement, vasomotor constriction or dilatation, innervation of the alimentary and renal viscera and secretory glands.

## AFFECTIONS OF THE SPINAL MENINGES.

These affections are not of great clinical importance owing to their comparative rarity.

**Hemorrhage into the meninges** may be extrameningeal or intrameningeal. Traumatism, convulsions, or violent muscular exertion are about the only causes.

In some of the cases there are no symptoms. In other cases pain is the most frequent and important symptom; its position corresponds to the point of hemorrhage, but it may be felt over the greater length of the spinal column. Pain is increased by moving. Pain may be referred to the distribution of the spinal nerves; it may be sharp and lancinating.

The girdle sensation may be felt if the affection is in the thoracic region.

Hyperæsthesia and hyperalgesia of the skin and muscles may be present. Anæsthesia of skin over a wide distribution may be present.

Muscular spasms may take place in the muscles of the back;

sometimes rigidity and jerkings are met with in the lower limbs, and occasionally general convulsions take place.

Loss of power may be partial and at times complete. If general, it may be due to the rupture of an aneurysm. Loss of knee-jerks is often present, especially at the onset.

Retention of urine is frequent, but incontinence may occur.

The symptoms reach their maximum as a rule in a few hours, but a few days may intervene, and the onset may be gradual, without pain, and paralysis becomes manifest later. The course depends on the degree of hemorrhage and upon cerebral complications. As a rule, there is an abatement of the symptoms in three or four days, followed in a day or two by an inflammatory reaction, with the presence of fever. This lasts two or three days, then permanent improvement sets in, and the symptoms may all clear up in the course of six weeks. This favorable course may be interrupted by meningitis, cystitis, and bed-sores. Myelitis may set in if the lesion is severe; this can be told by the increase of the paralysis, especially of the sphincters.

Diagnosis.—When there has been an injury to the spine, or after violent convulsive actions, if there be violent and sudden pain in the back which, after a time, radiates and gives signs of irritation of the nerve roots, with, perhaps, loss of power in some of the muscles, we may readily suspect hemorrhage into the meninges. When the symptoms come on gradually there is great difficulty in making the diagnosis.

To distinguish between hemorrhage into the meninges from into the cord we have in the latter case more paralysis, less pain and symptoms of spinal irritation, and in those who recover there are generally signs of a small area of cord destruction, causing paralysis and atrophy of some muscles, especially of the sphincters.

Inflammation of the meninges is less sudden in its onset, and fever is present from the beginning. Myelitis is not painful; paralysis is more marked.

## INFLAMMATION OF THE SPINAL MENINGES.

1. **External Spinal Pachymeningitis.**—This is a rare affection and is always secondary to tuberculous inflammations of spine, wounds, bed-sores, aneurysms.

The presence of severe pain at a local point which may extend

to the spinal nerves at a certain point; hyperæsthesia of skin of certain areas; anæsthesia may also be present. Paralysis may take place from pressure, especially in caries with deformity, when the power of the extremities may be lost.

2. **Internal Hemorrhagic Pachymeningitis.**—Traumatism may be the cause, but it is more common in connection with a similar condition of the cerebral dura seen in general paralysis of the insane and chronic alcoholism.

The symptoms are those of subacute cerebrospinal meningitis, the spinal signs being pain in the back, stiffening of the vertebral column, spasm of muscles of back, and hyperæsthesia.

3. **Hypertrophic Cervical Meningitis.**—Exposure to cold, injury, and exertion have been considered causes. Syphilis is probably the most potent factor. The onset is somewhat gradual. Pain is the first symptom; it is often referred to the occipital region and the neck, but also radiates down the arms and may be felt especially in the larger joints; paroxysmal exacerbations of pain are frequent. There is rigidity of the cervical muscles and tenderness to pressure. Such symptoms keep up for three months or longer and are followed by atrophy and loss of power, the muscles supplied by the median and ulnar nerve being usually affected; the wrist becomes hyperextended, but this position is not constant. There is now less pain. Anæsthesia is present, corresponding to certain nerve roots, and may not be of the whole arm.

The last stage of the disease shows the effect of compression of the cord; there is spastic paraplegia, with interference with bladder and rectal functions; bed-sores may form.

The course of the disease extends over several years, and the symptoms in different cases vary a great deal. Pain may never be a marked feature, while trouble with the rectum and bladder with bed-sores may occur early.

The diagnosis may be difficult to make between this affection, caries of the spine, tumors, and syphilitic meningomyelitis. In caries the deformed spine is sometimes made out; there may be tuberculosis elsewhere; the subject may appear tuberculous.

In syphilitic meningomyelitis more difficulty will be met with; the history is not of much value, but in syphilis the disease does not remain so long localized and antisyphilitic treatment is of benefit. In tumors the signs are seldom as uniformly bilateral, and their progress is more rapid. Syringomyelia in the cervical

region may resemble this condition, but, as a rule, painful sensations are lost, while tactile feelings are preserved; painless felons are often present and the spine is usually curved laterally in syringomyelia. In muscular atrophy and amyotrophic lateral sclerosis sensations are normal.

4. **Syphilis of the Spinal Cord and Meninges.**—This may be due to inflammation of cord and meninges alone or with ostitis or gummata of the vertebral column. As a rule, gummata begin in the meninges, but the inflammation often takes the form of endarteritis, followed by degenerations of the cord substance. Syphilis often plays the part of indirect causation, while exposure or traumatism may be the direct causation.

These affections usually are not late tertiary manifestations, but usually appear within ten years after the primary sore. Hereditary syphilis may also be the cause.

The symptoms show great clinical variations. Cerebral lesions are very apt to occur at the same time, such as headache, giddiness, vomiting, convulsions, optic neuritis, inequality of the pupils, ocular paralysis, hemiplegia, facial paralysis, and bulbar paralysis. The concurrence of these symptoms may be of great help in the diagnosis.

Spinal symptoms are usually at first sensory. Girdle sensation, shooting pains in the limbs, troublesome pain in the back, especially at night. Paræsthesia and formications may occur in the extremities. The skin may be sensitive and the muscles tender. Tactile and temperature sense may be lessened. Anæsthesia is often present; it may be patchy and irregular. There may be some ataxia.

Weakness of the muscles of legs usually occurs early; paraplegia occurs in time. The lower limbs are much more often affected; one side may be worse than the other. Weakness of muscles does not always occur. The paralytic symptoms usually come on gradually, or occasionally very quickly; sometimes the weakness gets rapidly worse after having existed for some time.

The gait is usually spastic; there may be jerkings of limbs, with great reflex irritability. Sometimes the paralysis is of the flaccid variety. Sometimes groups of muscles are atrophied.

The knee-jerks are usually increased and ankle clonus may be present, but the reflexes may be diminished or lost. The sphincters are usually normal; bladder and rectal troubles are seldom present.

The course is usually very slow, but it may go on by fits and starts. Most cases improve under treatment, but absolute cure except in very mild cases is not to be expected.

The diagnosis is greatly helped by the concurrence of the symptoms of intracranial syphilis. A syphilitic history is important, but its absence is not helpful in doubtful cases. The variability of the symptoms; the changes in the cutaneous anæsthesia; the irregularity of the knee-jerk, perhaps exaggerated, perhaps lost or going and returning, are all very significant of syphilis.

Improvement of the case under antisyphilitic remedies does not prove the disease syphilis, as other diseases are sometimes helped by this treatment; still such a fact is of considerable value in the diagnosis.

The disease often resembles disseminate sclerosis; in the latter, nystagmus, scanning utterance, intentional tremor, and absence of meningeal and nerve-root symptoms are more common, but dementia, hemiplegia, and affections of the ocular muscles may occur in both.

In tumor the absence of cerebral symptoms, more irregularity of the motor phenomena, and more constant anæsthesia have considerable value in diagnosis.

Locomotor ataxia may resemble this affection in exceptional cases; but there is no paralysis in locomotor ataxia, and there is the Romberg symptom and the Argyll-Robertson pupil, which are seldom if ever found in the disease under description.

5. **Acute Leptomeningitis.**—Inflammation of the meninges of the cord is usually present in epidemic cerebrospinal meningitis, but during an epidemic it may affect the cord alone in exceptional cases. It may occur in sporadic cases. It may be secondary to some of the infectious diseases. It may be due to cold, traumatism, or infected wounds.

Premonitory symptoms may occur; there may be pain in the back and malaise. As a rule, the onset is rather sudden, with a chill, severe pain in the back, and fever. The slightest motion may be unbearable; exacerbations of the pain are frequent. Pressure over the vertebral column increases the pain.

Pain of a lancinating character may be felt along the distribution of the spinal nerves. The girdle sensation may be present. There may be marked hyperæsthesia of the skin and the muscles may be tender. Hyperæmia of the skin may appear following

a scratch with the finger-nail. Spasm of the spinal muscles is almost always present; in some cases there is pronounced opisthotonos. The back of the neck is usually arched; the head being pulled back. The muscles of the limbs may become rigid with spasmodic contraction. The reflexes are at first increased, then diminished. The urine is usually retained. Constipation is present. The pulse is usually frequent, but may be quite slow. Respiration may be difficult on account of the spasm of the respiratory muscles. The temperature is usually elevated, but it is rather an uncertain feature. If there is anæsthesia and motor paralysis, there is probably myelitis also. Loss of power may be very complete and the knee-jerks may be lost and the muscles become flaccid. Large bullæ may result from the pressure of one part against another or on the bed. Death usually follows from asthenia.

Sometimes there is an abatement of the symptoms, but the disease in time progresses and death takes place after some weeks.

There are cases which recover completely; others recover with more or less spastic paraplegia.

In some cases certain parts of the cord are affected and not others; these give special local symptoms according to the seat of the affection.

The diagnosis is seldom difficult. From hemorrhage it is distinguished by the latter being very sudden, less general in the distribution of the symptom, and no fever at the outset.

In myelitis there is little pain in the back or symptoms of spinal irritation. In tetanus there is seldom fever; there is seldom much pain in the back; the muscular spasm affects the temporomaxillary muscles more than any other.

Hysteria may show symptoms of spinal irritation with spasm, but there is no fever, as a rule, and the general make-up of the hysterical patient is almost always present.

Lumbar puncture may obtain pus in leptomeningitis or the diplococcus intracellularis in epidemic forms, or tubercle bacilli in tuberculous forms.

6. **Tuberculous Spinal Meningitis.**—This affection is seldom present without the cerebral meninges being affected.

## TUMORS OF THE SPINAL MENINGES.

New-growths are not of frequent occurrence. Intradural lipomata may be congenital, while extradural fatty growths are met with in early life.

Tuberculous tumors are most common between the ages of fifteen and forty, although they are sometimes met with in children. Myxomata are found during middle life. Malignant cancerous growths occur late in life. Cysticercus and echinococcus cysts have been found.

Sarcomata are the most frequent of all spinal tumors; they may occur at any age, although more common in young adults. Fibromata, neuromata, and angiomata are sometimes seen.

The tumors are situated either inside or outside the dura, the former being about three times as frequent.

The symptoms and signs of these tumors depend mainly on the pressure effects—on the nerve roots, on the spinal cord, and on the vertebræ.

The effects on the cord are usually preceded by the effects of pressure on the nerve roots, the symptoms of bone pressure coming later.

The cord becomes involved much earlier in the case of intradural tumors, while the extradural tumors may involve the nerve roots a long time before the cord.

The exact symptoms affecting the motor and sensory nerves depend altogether on the situation of the tumor, its size, and the degree of pressure on the cord or nerve roots or vertebral column. These symptoms can be determined by studying pressure effect at certain points in the cord.

## MYELITIS.

Under this title are considered diffuse forms of spinal-cord inflammation which is not confined to special tracts, although it may be confined to sections. The result of such an inflammation will cause two sets of symptoms, one set due to the cutting off of the higher centres in the brain, and thus doing away with voluntary muscular control, producing spasticity and increased reflexes and loss or modification of various kinds of sensation. The other set is due to the destruction of nerve centres in the cord, producing paralysis with atrophy in some

groups of muscles, lost reflexes, trophic disturbances in the skin, muscles, and bones, pain, loss or modification of sensation.

**Acute Disseminated Myelitis.**—This condition can be told by the occurrence of a rapidly ascending paralysis. At the onset there may be a numbness or tingling in the legs and difficulty in voiding the urine. The paralysis soon becomes complete and anæsthesia of the skin is present, reaching as far as the abdomen or even to the nipple. Reflexes are abolished. The bladder is paralyzed and retention of urine occurs. The feces are discharged involuntarily. As the lesion extends upward breathing may be interfered with from intercostal paralysis. Congestion of the bases of the lungs takes place and death may be brought about by respiratory insufficiency. This may occur within two weeks, although it generally does not occur for from four to six weeks or longer.

The temperature is usually high. There may be delirium at night. Cystitis is almost sure to take place from infection with catheters. Bed-sores form early. At first there may be some faradic response, but this becomes less and less. Galvanism gives the reaction of degeneration. Some cases may live for months if the cord tissue is not completely destroyed; a little power and slight sensation may be regained. Death usually results from cystitis and pyelitis or septic poisoning from the bed-sores.

Recovery in a few cases does take place.

ACUTE DISSEMINATED MYELITIS ACCOMPANIED BY INFLAMMATION AND DEGENERATION OF THE BRAIN sometimes occurs in children after infectious diseases. The distinctive features of these cases may be paralysis followed by unconsciousness; this latter symptom may clear up and ataxia or choreic movements may occur. The intellect may be disturbed; there may be nystagmus and scanning speech; the loss of power may not be complete. There may be an ataxic gait, increased reflexes, and intentional tremor; there is usually some spasticity. Death is rare and many cases recover completely with rapidity. Other cases relapse, but recover in the end. Sometimes disturbances of speech or blindness is left.

**Transverse Myelitis.**—This affection is most common in the dorsal region as a result of pressure. We usually first have the symptoms of the local condition; then follow numbness, tingling, or formication in the lower extremities, with weakness of the legs and inability to pass urine. The loss of power extends up

to the abdomen and is more or less complete. The reflexes are increased. With a severe lesion loss of sensation is complete to touch, temperature, and pain. Analgesia may be present. There may be a girdle sensation or pain at the upper limit of the anæsthesia. Above the anæsthesia may be a band of hyperæsthesia in the skin. Nutrition of the muscles is not materially affected. The muscular reactions are normal. The legs are spastic and powerless. Contraction of the muscles may take place in time. In some cases spasticity is not noticed until the legs are handled. The urine may be retained at first from paralysis of the detrusor urinæ, but soon involuntary contraction of the bladder takes place and the urine is not retained. Constipation is usually present, but there may be involuntary passages of feces. Cystitis often results from the use of the catheter in the early stages. Bed-sores usually do not occur when great care is observed, but, as a rule, diminished cutaneous sensibility brings about sores from too long pressure on the back.

Myelitis in the lumbar region produces the signs of disseminated myelitis in that region. The muscles become flaccid, atrophy, and lose their reflexes. There is paralysis of the sphincters and incontinence of the urine and feces.

Myelitis in the cervical region is usually distinguished by the higher area of cutaneous anæsthesia and muscular paralyses, and because of destruction of some of the centres in the anterior cornua some groups of muscles of the upper extremity usually atrophy and lose normal muscular reactions.

Respiratory insufficiency from intercostal paralysis and, if high up, from diaphragmatic involvement, is often the cause of death.

Destruction of the ciliospinal centre may cause contraction of the pupil and slight closure of the lids. Vasomotor paralysis may also occur. The pulse may be very rapid and irregular. Hyperpyrexia may take place.

**Unilateral myelitis** may be due to pressure. In such cases the muscles are paralyzed on the side of pressure, but reflexes are preserved. There is a band of anæsthesia with a band of hyperæsthesia above it near the level of the lesion. On the opposite side there is anæsthesia below a band of hyperæsthesia, while the muscles are normal.

The course of transverse myelitis depends on the nature of the lesion and its treatment.

The diagnosis between transverse myelitis and hemorrhage into the meninges and cord may be difficult; in the latter the sudden onset with severe pain, together with the history of sufficient cause may be the only distinction.

Disseminated myelitis from multiple peripheral neuritis may be very difficult; in the latter there is usually more pain in the nerves and muscles, the paralysis is more extensive, the upper extremities being involved to a greater degree without disturbance of the respiratory function save in cases of beriberi. The face, too, may be affected. The bladder and rectum are not affected.

From Landry's paralysis we can only say that in this form of ascending paralysis sensory symptoms are insignificant; the bladder and rectum are not involved, but the distinction is very difficult in most cases.

**Chronic myelitis** is almost always secondary to the acute form of the disease, but in some of the cases the onset is insidious. When the chronic form follows the acute the symptoms persist. In most cases the lesion is in the dorsal region and the symptoms are loss of power in the legs, spasticity, anæsthesia, and incontinence of urine. When the lesion is in the lumbar region the limbs may be flaccid and the muscles atrophied. The bladder is usually inflamed and incapable of emptying itself; this condition with bed-sores usually leads to death.

In slowly developing cases sensory symptoms are usually noticed first—tingling, formication, anæsthesia—followed by weakness of the legs, with spasticity and increased reflexes if the lesion is dorsal. Spasticity with contraction may be a marked feature, so that the knees are flexed on the abdomen and the heels dig into the buttocks; sometimes the two thighs cross each other from powerful adduction. If the lumbar region is affected there is usually muscular atrophy with lost reflexes, but some of the muscles may be rigid.

When the cervical region is affected there may be eye, respiratory, and cardiac symptoms. The diagnosis may be difficult between this affection and amyotrophic lateral sclerosis; in the latter the absence of sensory symptoms and bladder and rectal involvement should determine the condition.

In multiple sclerosis there is intentional tremor, nystagmus, scanning speech, without sensory disturbance or bladder implication.

**Caisson Disease.**—This affection is due to working under greatly increased atmospheric pressure, then suddenly changing to low pressure. The lesion is congestion of cord, brain, and their meninges, with the occurrence at times of small hemorrhages and softening of the medullary substance. The symptoms and signs are rather sudden in their onset. Pain is the first thing complained of; it is usually felt in the extremities; it may come on gradually and is apt to be remittent; it is very severe as a rule. The lower extremities are affected in most cases before the upper. Severe pain may be felt in the back. Epigastric pain with vomiting is frequent. Vomiting may occur without pain. Vertigo may be associated with it.

Paralysis is of variable degree and distribution according to the severity of the affection. The lower extremities are more frequently affected than the upper. Anæsthesia of the skin is a regular thing. The paralysis may be slight and fleeting, or it may be complete and permanent. The bladder is almost always affected.

Cerebral disturbance may be indicated by vertigo, double vision, and incoherence of speech. The skin may show purpuric patches. The duration of the attack varies. Slight cases last from one day to one week and recovery takes place. In some cases paralysis is prolonged for several weeks, but recovery usually takes place.

Fatal cases usually occur during the first few days, but death may occur after several weeks. Cystitis, pyelitis, and bed-sores are frequent complications.

## HÆMATOMYELIA.

Hemorrhage into the spinal cord, excluding traumatic causes, is exceedingly rare. Injury, excessive exertion, exposure, and endarteritis may be a cause. It may occur without known cause.

The symptoms are very sudden. There is sudden loss of power in certain muscles, with severe pain in the back at the point of the lesion; the pain is more localized than in meningeal hemorrhage, and though it may extend to the extremities according to the special area, it seldom diffuses itself. Occasionally prodromata, such as tingling and numbness in certain areas, have been noticed. The paralysis depends on the site of the

lesion; the muscles are flaccid and reflexes are lost. Myosis may occur on one or both sides, with ptosis. The pulse may be fast or slow. Paralysis of the intercostals may make the breathing diaphragmatic.

Anæsthesia may be complete below the lesion. The sense of touch may remain and sensation to heat, cold, or pain may be lost.

The knee-jerks are usually abolished soon after the onset, no matter where the hemorrhage is; after a time they may return and become exaggerated and the muscles get spastic, but this sometimes does not follow even with hemorrhage in the cervical region.

Constipation and retention of the urine occur early, and incontinence follows later. Priapism may occur.

There is usually fever a few days after the onset, but the temperature may be abnormally low when the lesion is in the cervical region. If the patient survives, atrophy of the muscles corresponding to the site of the lesion occurs. If the lesion is high up, spasticity and increased reflexes may result.

The disease may be immediately fatal, or death occurs from secondary inflammation a few days after the onset, or the patient dies from respiratory troubles. Others recover partially, but some paralysis, anæsthesia, or spasticity are usually left.

The diagnosis from acute myelitis may be very difficult; it is usually seen that in the latter the onset is less sudden and not so painful, extension is more gradual, and temperature is raised at the beginning.

From meningeal hemorrhage it shows less nerve-root irritation, as shown by violent pain in the limbs and jerking of the muscles; paralysis of the upper limbs is greater if there is hemorrhage in the cord. Myosis is not present in meningeal hemorrhage. The temperature sense is less often affected in meningeal hemorrhage. The later results of hemorrhage may be very difficult to distinguish from syringomyelia.

## SCLEROSIS.

**Multiple sclerosis** is a disease of the spinal cord, brain, and nerves, characterized by irregular areas of sclerosis which destroy the nerve elements.

The disease is most frequent between the ages of twenty and

thirty; it is met with in quite young children, but very seldom after middle life.

The symptoms in regular types of the affection can hardly leave much doubt as to its nature, but many of the cases show very irregular symptoms.

In the classical form the first thing noticed is some difficulty in walking, a tremor, a nervous manner, and different way of speaking, The patient's difficulty in walking is due to spastic paraplegia. The knee-jerks are greatly exaggerated and there is ankle clonus. The arms are not paralyzed, but intestinal movements cause marked tremor, with a very jerky motion. Nystagmus is usually present when the eyes are moved upward or from side to side. There may be diplopia, with a squint. The speech may be scanning, with a pause between the words and syllables. There may be temporary blindness, vertigo, and tinnitus aurium. Paræsthesia of the extremities may be felt. Cerebration may be dull. Epileptiform seizures sometimes occur. Trophic disturbances may occur late in the disease. In the early stages the bladder and rectum are all right, but later there may be incontinence.

In many cases the cerebral symptoms are lacking; in such cases there is usually some spasticity and increased reflexes and tremor of the hands; in other cases knee-jerks may be lost and reappear. The legs may be weak. There may be difficulty in passing water or there is loss of sphincter control. In some cases groups of muscles may atrophy from destruction of spinal centres. Trophic disturbances of skin sometimes occur, especially late in the disease. Transitory hemiplegia is sometimes seen.

In one type of cases with spinal symptoms there is optic atrophy, which affects the temporal halves of the disks. In such cases with absent knee-jerks and difficult walking, locomotor ataxia might easily be confounded with it, but the muscles are always stronger in the latter.

In some cases spastic paraplegia and increased knee-jerks are not present, but scanning speech, nystagmus, and nervous manner may be the chief symptoms.

During late years symptoms which appear to have little relation to the above classical types, but have been considered as functional or hysterical, have been shown either to be forerunners of the regular symptoms or in themselves are the only

clinical manifestations of multiple sclerosis. These cases are more common in women and many of them have appeared after mental shock.

One manner of onset is with aphonia, which is temporary, but may recur. Patches of numbness may be noted, or such sensations as "deadness," "coldness," or "pins and needles" complained of. There may be loss of power in one or more limbs, which passes off. These symptoms may pass off and come back abruptly after a considerable interval of time. In many such cases recovery of power is not quite complete. These patients may be hysterical in manner; they get tired easily. After years, perhaps owing to exhaustion from some temporary cause, the disease may begin with vigor and get better again. Periodicity is a marked feature. In time such a patient may become quite bedridden. There may be paraplegia without spasticity, but with atrophy and contractures. The upper limbs may share in the paralysis. There may be areas of numbness and anæsthesia. In some, sight is affected. Tendon reflexes may be exaggerated. The power of the sphincters is diminished or lost.

The intellect is usually clear, but they are often emotional. Some of the cases become demented.

An analysis of the physical phenomena of usual cases is of interest. Muscular tremor is brought out by intentional movements; in using the hands and arms the whole member begins to wave until motion is at its height at the time the object is nearly reached; the head and body sometimes share in the motion.

In almost all cases this intentional tremor is present in some of the muscles. The head alone may be affected, and because the muscles of the neck are never at rest a slight motion is always present unless the patient is lying down.

The handwriting becomes more illegible as it proceeds. The movements may appear ataxic, but closure of the eyes does not increase it. Attacks of unintentional yawning, crying, hiccough, or laughing may occur. Spasticity is usually present in the legs; the extensors are most affected and it is increased by passive motion. Contractures are infrequent. Knee-jerks are almost always increased save in a few exceptional cases.

Motor weakness is always present in some degree or form; it is usually associated with rigidity, but not always; paralysis is never absolute; movements, even perhaps with great difficulty, can be executed, but the first efforts are the best; with any

resistance fatigue is soon induced. The legs are usually affected more than the arms, but the neck, tongue, and muscles of speech are also affected. Mastication may also be affected. Apoplectiform attacks of a transient character may occur, followed by hemiplegia and aphasia. Paralysis of face may occur on the opposite side.

The gait is variable; as a rule it is the ordinary spastic gait; the legs are slightly flexed and the anterior part of the foot clings to the ground; after being released it comes forward quickly and the heel falls sharply to the ground. Sometimes the legs are separated; one leg may seem ataxic and the other spastic. One leg only may be affected. Variations in the gait are frequent from remissions of the symptom. Some patients are unable to walk; others have to be aided.

Speech may be "scanning" or "staccato," but it is often unchanged. The pitch of the voice is not well regulated. The first word may be clearer than the others.

Disturbances of vision are frequent; a mist may seem before the eyes; the onset may be sudden or gradual. Amblyopia may come and go and finally be very marked. One eye may be affected before the other. Central scotoma is frequent. Contraction of the field of vision is frequent. Pallor of the optic nerve is one of the first changes; marked atrophy may occur. Optic neuritis may also be present. Visual changes may exist and no changes be seen in the fundus.

Nystagmus occurs in about 50 per cent. of the cases; it is increased by looking to the side or upward. Ocular paralysis occurs in about 15 per cent. of the cases.

Sensory defects are not often pronounced, but search will usually find some trouble. Giddiness is often complained of, especially on motion. Headaches are often paroxysmal. Paræsthesia is not infrequent; burning feelings or "pins and needles" are common. Cramps are not infrequent. All forms of cutaneous sensibility may be changed, especially in the hands and feet.

Anæsthesia or hemianæsthesia may occur. Trophic disturbances may occur in advanced cases. Inflammations of the joints are not uncommon. Atrophy of some groups of muscles is occasionally met.

Difficulty in passing water may be met with early, but it is only late in the disease that incontinence takes place. Sexual excitement may be increased, but is usually diminished.

The course is usually very chronic and slowly progressive, or the course is interrupted with intercurrent attacks of amblyopia, apoplectiform seizures, and hemiplegia; or there may be distinct remissions.

Occasionally the symptoms improve and cure takes place. The duration must be reckoned by years. Death finally results from pulmonary or bladder and kidney affection.

The diagnosis in most cases is easy, but in some cases great difficulty exists in its distinction from hysteria. The presence of nystagmus would rule this out; also changes in the optic nerve and, as a rule, visual disturbance. Loss of sphincter control is not seen in hysteria. If knee-jerks are abolished hysteria is unlikely, but this is seldom the case in sclerosis. The usual stigmata of hysteria is of great help.

Lateral sclerosis has no arm, ocular, or speech defects, but in some cases of multiple sclerosis the early symptoms may be the same as lateral sclerosis.

Hereditary or Friedreich's ataxy comes on earlier and more than one in the family is usually affected. Knee-jerks are usually absent and deformities may be present.

Locomotor ataxia may resemble cases without spasticity and knee-jerks. In sclerosis the pupils are seldom contracted and they respond to light. When knee-jerks are absent in sclerosis, atrophy is usually marked.

Cerebrospinal syphilis may give rise to the spinal symptoms of sclerosis, but nystagmus and scanning speech are not present. Cerebral effects are usually present in syphilis.

**Lateral sclerosis** is a chronic inflammation or degeneration of the descending fibres of the crossed pyramidal tracts of the spinal cord.

The disease is most common in adult males, although females are affected almost as frequently. The disease begins insidiously; the first symptoms noticed may be fatigue without much effort and increased knee-jerks; one side may be more marked than the other.

After a considerable length of time walking becomes difficult, all the muscles become tense, and one walks as if on a slippery spot. After exertion, on lying down, clonic spasms of the feet and legs occur, but such spasms may occur after striking the toe. As the disease advances the legs seem glued to each other and to the floor on walking; passive flexion at the joints is

almost impossible; the least touch sets the leg into a violent spasm.

If the disease extends high enough, motions of arms may be difficult, and the elbow and wrist reflexes are increased. The skin reflexes are usually increased.

The function of the nervous system otherwise is not impaired.

In the last stages locomotion becomes impossible. Contractures and deformities take place. As a rule, late cases develop into amyotrophic lateral sclerosis.

The diagnosis is seldom difficult. Hysteria may simulate the disease, but it comes on more suddenly and usually lets up for a time at least; the ordinary hysterical stigmata are also present. The gait in such cases becomes worse when studied; the whole foot is rigid and the heel is worn as much as the foot.

In secondary lateral sclerosis the cause can usually be discovered. The onset is sudden.

From multiple sclerosis early cases may be very difficult, but, as a rule, the cerebral symptoms begin soon enough to make a diagnosis of multiple sclerosis.

From spastic paraplegia of cerebral origin it may be difficult without a history; as a rule, the latter comes on suddenly and there are cerebral symptoms.

**Amyotrophic lateral sclerosis** combines sclerosis of the lateral columns with degeneration and atrophy of the cells in the anterior cornua of the cord.

It occurs most frequently in women between thirty and fifty.

The first thing noticed is rigidity of the muscles of the arms, attended by some pain and tingling and moderate loss of power, with slight atrophy. After two to twelve months the legs become spastic without atrophy; then after a variable period the symptoms of bulbar paralysis occur. This course is by no means invariably followed, but cases usually present either symptoms of lateral sclerosis followed by anterior cornua involvement or anterior cornua involvement followed by lateral sclerosis.

In the first type weakness, fatigue, and stiffness begin in the arms or legs. The deep reflexes all over are exaggerated; the reflex of the lower jaw may be obtained in some of the cases.

Muscular atrophy may not begin for some time; it may affect the tongue first, although the muscles of the limbs may waste soon after the onset. The atrophy usually begins in the small

muscles of thumb and interossei, as in progressive muscular atrophy.

Fibrillar contractions are seen in the wasting muscles. Muscular reactions are mixed; the faradic is diminished and the galvanic gives reaction of degeneration. The spasticity and contractions of the muscles of arm produces flexion of fingers and wrist and the forearm is pronated; the elbow is semiflexed and the humerus is held tightly against the body. The hands may look clawed. If the muscles of neck are attacked the chin falls forward and the neck is stiff. The legs are spastic, but atrophy is seldom present; the spastic gait is typical. Symptoms of bulbar affection are likely to follow. The muscles about the mouth are atrophied with rigidity; the muscles of mastication may also be affected, but the upper face muscles are not attacked. The tongue, soft palate, and vocal cord muscles may be atrophied and slightly rigid. The intercostal and abdominal muscles may be rigid, and breathing is diaphragmatic; the patient is liable to respiratory crises, with frequent labored breathing and badly acting heart from which he may die. Sensory disturbances and trophic changes do not occur in the skin. The face looks melancholy, but spirits are not depressed. They are emotional and may cry and laugh irrationally. The muscles of the upper extremities continue to waste and after the muscles have almost disappeared contractures are less marked. The sphincters are never affected.

In the second type of cases atrophy begins in the small muscles of hands and gradually affects the arms. Rigidity soon occurs in the lower extremity and afterward attacks the upper, so that after some progress has taken place the two types are inseparable.

The diagnosis is not difficult after some progress has taken place, but when atrophy of the muscles of hands is an early symptom it might well be mistaken for chronic anterior poliomyelitis, but the increased reflexes will soon rule that out. From pressure on spinal cord in the cervical region, with degeneration of cells in some of the anterior cornua, we should always look for causes of pressure. The groups of muscles atrophied are less regular in pressure and sometimes myosis is seen. Again, bulbar symptoms are never present in cases of pressure.

From simple lateral sclerosis the atrophy of hand muscles and contractures easily distinguish it, and the same can be said of

disseminated sclerosis; while the latter has the characteristic cerebral symptoms in most cases. The course of the disease is rather rapid and seldom lasts longer than three years. Death usually takes place from laryngeal difficulty or respiratory diseases.

## ATAXIA.

**Locomotor ataxia** is a chronic inflammation or degeneration of the posterior columns and nerve roots of the cord. In the brain the cerebral nerves and their ganglia may be degenerated. Gray degeneration of the optic nerve sometimes occurs and occasionally the cells of the retina.

It occurs almost exclusively in males between forty and sixty. The progress of the disease may often be divided into three stages. In the first there is no inco-ordination. In the second there is ataxia which interferes with walking. In the third walking and standing are impossible.

The usual course begins with pains, which are generally felt in the legs; there are many kinds, but the most frequent and characteristic are sudden and lightning-like, first felt in one place, then in another, being of momentary duration. Such pains may be felt in the upper extremities or face. Sometimes the pain is dull and aching, being felt in extremities or back. Cold and exertion may aggravate the pain. Other symptoms which may occur early are diplopia, squint, or ptosis. There may be a little difficulty in starting the urine, or it may pass involuntarily at times, or the desire is pressing to void urine. On examination the knee-jerks at the very earliest stage are usually found absent. In rare cases they are present or even exaggerated.

The pupil does not contract on exposure to light; this is called Argyll-Robertson sign. The pupils are usually contracted; one may be larger than the other. Sometimes the pupils do not react to accommodation. In the second stage there is increasing ataxy or inco-ordination, which is due to want of proper relativity of muscular force used in motion because of lost or diminished muscular sense. At first this is hardly noticed, then any hurried effort is not done with precision; motion in the dark is less easy, while walking with the eyes shut may be impossible. After a while the subject walks with feet spread widely apart; the legs foul one another on twisting around; finally the typical ataxic

gait is seen. The patient rises slowly, bends at the hips, uses a stick, spreads the legs apart, raises first one foot high and brings the heel down with a jerk, and follows it with the other. When the feet are placed together and the patient is asked to stand with the eyes shut, there is violent swaying and the eyes have to be opened to prevent falling—this is called Romberg's symptom.

The hands and arms become ataxic so that writing, dressing, and working become difficult.

If the eyes are closed and the patient is directed to touch the tip of the nose, he usually hits wide of the mark.

Abnormal and defective sensations are now of common occurrence. Numbness or tingling is frequent. The sensation of treading on feathers or wool or something interposed between the feet and ground is often complained of.

Anæsthesia and analgesia, loss of temperature and of touch sensations may be found in different parts of the body, especially in the legs; there may be delay in the transmission of these sensations, especially that of pain. The sense of posture may be lost. The disease usually increases from below upward.

The third stage is one of great helplessness; the subject may be confined to the bed. The bladder may not empty itself. Bed-sores and cystitis are now of frequent occurrence. Sometimes the muscular power of legs is almost lost.

In locomotor ataxia there are certain occurrences in connection with the nervous system to which the patient seems especially liable. Genuine motor paralysis is not infrequent; this may be seen at any time of the disease.

Ocular paralyses are not uncommon; they may be transient. Sometimes there is paraplegia or hemiplegia, from which they may recover. Paralysis of the peroneal muscles may be seen. Paralysis of one-half of the tongue, with atrophy and deviation toward the paralyzed side when the tongue is protruded, is sometimes present.

There may be lost sense of taste and smell. Deafness occasionally occurs from atrophy of the auditory nerves or retraction of the drumhead.

Atrophy of the optic nerve occurs in about 15 per cent.; it is often one of the earliest symptoms of tabes; the field of vision becomes contracted and there may be color blindness. Optic atrophy may be very important in the early diagnosis.

Ophthalmoplegia externa is often very serious and may result

in immobility of the eyeballs; before this the movements may be jerky, but there is no nystagmus.

Visceral crises are very important, gastric crises may be the earliest symptom. In these crises there is severe epigastric pain, followed by severer uncontrollable vomiting, which, after some hours, lets up suddenly; such attacks occur at irregular intervals. These attacks usually pass off during the second stage. Intestinal crises with pain and diarrhœa may be associated with the former or occur independently. Occasionally pains in the kidney, urethra, and bladder, with frequent micturition, make one think of calculus. There may be violent erections and emissions.

The larynx may be affected with bilateral abductor paralysis; at first it is slight, but as it increases in degree it makes breathing during exertion difficult; then there may be attacks of dyspnœa due to slight laryngitis or from extra exertion or talking. Spasm of the normal larynx sometimes occurs, accompanied by dyspnœa and cough. In abductor paralysis patients may die from suffocation, so that in bad cases tracheotomy is an advisable safeguard.

Cardiac crises may simulate angina pectoris; the heart is frequent and irregular and there is great dyspnœa.

Myocarditis and arterial sclerosis are common complications.

Trophic lesions affecting the joints are important; the so-called Charcot's joint usually occurs during the first stage of the disease. The large joints, especially the knees, are most often affected; one joint is usually affected.

The onset may be sudden, although pains around the joint or a slight injury may precede the occurrence of an effusion; the soft parts about the joint may be œdematous. There is no heat, tenderness, or pain. Sometimes the effusion disappears and there are no signs left, but usually the joint is completely disorganized, the ligaments are stretched, and the cartilaginous surfaces more or less destroyed, so that there is great mobility of the joint, which may be displaced spontaneously. Occasionally there is an osteophitic growth of bone around the joint. Spontaneous fracture of the long bones may occur, especially near a diseased joint. Rupture of the tendo Achillis has occurred. Perforating ulcer of the foot is not rare. Deformities or loss of nails is sometimes seen. Herpes may occur in the skin. Purpura has been noticed.

The ordinary course of locomotor ataxia is several years; in

the first or second stage there may be a cessation of progress, but this is infrequent. Tabes may not shorten life, but there is always danger from cardiac, laryngeal, bladder, and cerebral complications.

Cases have occurred in which the upper limbs were affected before the lower, or the ocular signs may precede the others for a long time.

The diagnosis can hardly ever be difficult in well-established cases; the only other possibility might be a multiple neuritis or general paralysis. In the former the loss of power comes on much faster, there is no true ataxy or Romberg symptom, and no myopia or loss of accommodation to light. In general paralysis signs of mental degeneration and a swifter course make the diagnosis easy.

The early diagnosis of locomotor ataxia is often not made before ataxic symptoms are present, chiefly because the physician is not on the lookout for early symptoms, but when the patient presents himself with visual disturbance and optic atrophy or with any of the crises or trophic disturbances, one should look diligently for the Argyll-Robertson pupil, loss of knee-jerks, and Romberg's symptom. Such cases are only too often put down to the need of glasses or for stomach disturbances or rheumatism simply because of an incomplete examination or want of thought.

**Ataxic paraplegia** is a chronic affection of the spinal cord combining sclerosis of the lateral and posterior columns. The first symptoms noticed are fatigue and difficult walking; the knee-jerks become exaggerated. There is some ataxia and much difficulty in walking at night. Romberg's sign is present.

There are seldom crises or severe pains. In time the affection seems more like pure lateral sclerosis. Its clinical history is almost the same.

There is another type of this affection which runs a much faster course. It begins with weakness, anæmia, emaciation, and sometimes diarrhœa, and after a time spastic paraplegia sets in. Anæsthesia and ataxy may be seen in some cases, but we more commonly find spasticity and increased reflexes. The disease is usually fatal within two years.

HYSTERICAL SPASTIC PARALYSIS is much more common in the female sex.

In some cases there is a well-marked history of hysteria and during an emotional attack the spastic symptoms arise; in other cases the trouble begins insidiously. The most common variety follows shock or railway injury, and the ordinary symptoms of spastic paraplegia are present. In such cases contractures arise quickly and may assume a very severe form. Instead of toe scraping the whole foot is moved forward and the symptom seems purposely exaggerated. The knee-jerk is not as much affected and pain in the back may be complained of when the knee is tapped. Ankle clonus is not present.

The upper extremities are sometimes affected.

The prognosis is generally good, especially when damages for injury have been obtained.

**Friedreich's ataxia** is a rare affection of the spinal cord consisting of an overgrowth of neuroglia and destruction of nerve elements in the posterointernal and much of the posteroexternal, crossed pyramidal, and direct cerebellar tracts, Clarke's vesicular column, and sometimes the tract of Gowers, with cerebellar atrophy.

The disease occurs early in life, especially between six and fifteen, but it may occur between two and twenty-four years. As a rule, several members of the family are attached, and there is usually a neuropathic family history.

The earliest sign is ataxy of the legs, but the arms are soon affected; at first there is simply unsteadiness; soon the gait is staggering with the legs held far apart, but the feet are not lifted high and brought down with force as in locomotor ataxia. Closure of the eyes does not produce much difference. When the arms become affected the finer movements are almost impossible; picking up a small object is done with a wide and erring swoop. The head usually sways and jerks. Speech becomes impaired; it is thick and slow. Nystagmus is frequent. Intelligence is good, but the face looks vacant. The pupils react normally and there is no visual disturbance. Skin reflexes are usually present, but the deep reflexes are lost early. Sensory disturbances, lightning pains, and crises never occur. There are no trophic changes and bladder and rectal functions are normal. The spine is usually curved laterally from muscular weakness; sometimes there is a hump.

One of the most characteristic deformities is "pes cavus"—the foot is short and greatly arched; the last phalanx of the toes

is flexed and the other much extended, so that the tendons are prominent. A similar deformity of the hand is sometimes seen, called the "manus cava," which looks claw-like.

The progress of the disease is steady, but slow; death usually takes place from some intercurrent affection. The diagnosis is not difficult when there is knowledge of the disease.

The disease affecting more than one child in the family and its occurrence in childhood are distinguishing features, but in single cases which occur in young adults the diagnosis might be confounded with locomotor ataxia, which resembles it in the absence of knee-jerks, but differs in its pupillary signs, neurotrophic disturbances, absence of deformities, presence of lightning pains, and in the manner of its ataxy and in speech; from cerebellar ataxia, by the later occurrence of the latter, which presents no deformities and no loss of reflexes, and has a staggering gait.

**Hereditary cerebellar ataxia** is a chronic hereditary atrophy of the cerebellum.

The disease almost always occurs after twenty. It usually attacks one generation after another, and usually is transmitted through females, but males may transmit the affection.

The onset is insidious, but well-established cases are very characteristic. Voluntary motion is much affected; there is a constant tendency to choreic movements and equilibrium is lost, which makes the gait hesitating and stumbling.

Knee-jerks are increased.

The arms and hands cannot be moved with precision; articulation is defective, owing to want of precise action of the muscles. Vision is poor, owing to atrophy of the retina and choroid. Muscular paralysis and nystagmus are frequent. Reaction of the pupil to light and accommodation may be lost. Marginal scotoma and acromotopsia may be present. Sensory changes are not important. Hearing may be defective. Vertigo is sometimes complained of. As the disease advances spasticity of the limbs occurs, but there is little tendency to deformities of the extremities or trunk. The disease is very chronic, but the patients are apt to die from intercurrent affections.

The diagnosis has to be made from cerebellar tumors. In differentiation the family history is important, but the absence of severe headache and other symptoms of brain pressure, in

conjunction with ocular and speech symptoms, choreic movements, and greatly increased knee-jerks make a clear case for cerebellar ataxia.

## SYRINGOMYELIA.

**Syringomyelia** is characterized by the formation of a cavity of varying length within the cord.

The disease may occur at any age, but is more common in late youth and early adult life.

The cardinal signs are (1) the loss of sensations of pain and temperature, that of touch being preserved; (2) trophic disturbances of the skin, muscles, bones, or joints; (3) progressive muscular atrophy, attended with paralysis.

Other symptoms which may be present are those of transverse myelitis, either of the entire cord or of the lateral or posterior columns.

The location of the symptoms depends on the site of the cord lesion.

The most frequent site is in the cervical region, so that the early symptoms are usually in the hands. Sometimes the disease is limited to a small segment of the cord, but it may extend throughout its length or even up to the medulla and pons.

Disturbances of sensation in the skin is a very characteristic feature; the sense of touch is preserved, but pain and temperature sense is lost; sometimes heat may be appreciated and cold cannot, or *vice versa*. Because of the loss of the sense of pain the patient is exposed to injuries and consequently to such affections as felons, cellulitis, inflammations of the joints, and blood poisoning. If the posterior columns are involved the sense of touch may be blunted and muscular sense diminished.

It is by the position of the areas of lost pain and temperature sense that the site of the lesion can be accurately located, because the fibres which convey these sensations pass from the posterior nerve roots through the gray matter at that level and then to the ascending anterolateral white columns.

The distribution of the analgesia is usually irregular. The fingers and hands are most frequently affected because the lesion is in the cervical region. The areas of lost pain and temperature sense may not coincide exactly. In early and slight cases these senses may be only blunted.

Trophic disturbances are very important in syringomyelia; in most cases they occur in the extremities and are caused by trauma or burns which have become infected and have gone on to ulceration or suppuration. All cases cannot be ascribed to this cause, but it is believed that the lesion affects nutrition. There may be hyperæmia, anæmia, dryness, or sweating of the skin. There may be subcutaneous bullæ or local gangrene. Painless felons with small abscesses about the fingers are frequent. The nails are either hypertrophied or fine and brittle; they may be ridged and fall off. Joint affections are very frequent. The wrists, elbows, and shoulders are most frequently affected, while the joints of the lower extremity seldom become affected. The changes are almost exactly like the Charcot joint; first a large effusion and then disorganization of the joint. Spontaneous fracture may occur in the long bones; these lesions occur without pain. In many of the cases there is a marked lateral or forward curvature of the spinal column; the upper portion of the dorsal region is most affected. The cause of the curvature is either muscular weakness or from changes in the vertebral bones.

Muscular atrophy with paralysis is present in about 50 per cent. of the cases; it usually invades the small muscles of thumb and the interossei first, finally producing the claw-hand. It then advances up the arm to the shoulder. Sometimes the shoulder muscles, biceps, and supinator longus are first affected. The muscles of the spine are particularly liable to be affected, and this accounts for the curvature in some of the cases. The legs are less frequently affected and, if they are, the upper muscles are the most affected; contractures of the legs have been seen. The muscles paralyzed usually show fibrillary contractions. The reaction of degeneration does not occur until very late in the disease.

The spinal reflexes are diminished in the upper extremity when the muscles are attacked, but the knee-jerks at this time may be increased; but when the lesion is in the lumbar region the knee-jerks may be lost; in such cases there may be paralysis of sphincters and bladder. If the spinal centre of the cervical sympathetic is affected in the first dorsal segment there may be myosis, ptosis, or narrowing of the palpebral fissure, flattening of one or both sides of face, and defective secretion of sweat. If the disease extends to the medulla there may be atrophy and

fibrillary contraction of the tongue and facial muscles, nystagmus, and ocular paralysis.

Sometimes there is loss of pain and temperature sense in the face; less frequently there are disturbances in swallowing and breathing and irregular heart action, showing that the vagus is affected. Such cases are usually quickly fatal.

The course is chronic. It may begin after an injury, and the symptoms are marked before the diagnosis is made. The affection may remain for months in a stationary condition. It may advance rapidly and involve most of the body. Death usually occurs from intercurrent disease or blood poisoning. Sudden death from rupture of the wall of the cavity has occurred.

FIG. 13

Claw-hand. (Gray.)

The diagnosis in the early stage with muscular atrophy of the hands may be difficult to differentiate from progressive muscular atrophy or chronic anterior poliomyelitis, but the appearance of sensory disturbances or trophic changes will clear these cases up.

When the lumbar segment is first affected it resembles locomotor ataxia, but there is loss of power without ataxy, there are no pupillary signs, and there are different sensory disturbances.

From amyotrophic lateral sclerosis the diagnosis is made by the latter having increased reflexes, spasticity, and no sensory disturbance.

In disseminate myelitis the sensation of touch is not preserved, the signs are symmetrical, and trophic disturbances of skin, with

bladder and rectal complications, are more marked in the earlier stages.

Tumors of the spinal cord, especially glioma, may show symptoms like syringomyelia, but the signs are more symmetrical below the lesion; there is more pain, more spasticity of the legs, and great increase in the knee-jerks. The course of the disease is also more rapid. The sense of touch is not well preserved.

In bulbar paralysis the greater effect on the arms, with no sensory symptoms, even when bulbar symptoms show in syringomyelia, should make the diagnosis evident.

## POLIOMYELITIS.

**Acute anterior poliomyelitis** is a disease of the cells in the anterior cornua of the cord resulting in sudden loss of power in groups of muscles, especially in the limbs, which soon become atrophied.

The onset of the disease is like an acute infectious disease, with fever, chills, or convulsions, gastric disturbances and sometimes diarrhœa, with considerable pain in the back or extremities. It may begin with malaise. Young children are almost exclusively affected, but it has been seen at all ages. The fever keeps up, about 101° or 102°, for a few days, then becomes normal. Paralysis occurs within a day or two after the onset. One, two, three, or all four extremities may be affected, but the legs are more frequently affected than the upper extremity. Pain in the back and in the affected limbs may continue for some time, but this is not often a feature. There are no sensory or trophic disturbances.

The general health is soon restored, but the paralysis continues for some time and recovery is partial or complete. Some cases begin without fever or constitutional disturbance. The loss of power is always sudden and this is followed by atrophy. The muscles of trunk, neck, and face, even the eye muscles, are occasionally involved, but these usually recover.

The muscular reactions are always lost at first. The paralyzed muscles reach their greatest degree of atrophy in about six weeks, then there is a period of standstill, followed by improvement, which may be complete in six months or a year. If there is no improvement in one year none can be expected. In most of the cases some disability is left, even though it may be

very slight. In many cases there is considerable permanent paralysis.

The muscles affected are usually in groups which correspond to the centres which are destroyed in the anterior cornua of the cord.

In the leg we have the leg type and the thigh type. The leg type is most common, the paralyzed muscles being almost always the anterior tibial and the peronei; sometimes the posterior tibial are affected too. If the paralysis persists there is marked atrophy of the muscles and some variety of talipes, according to which muscles are chiefly affected; as a rule, talipes equinovarus is most frequent. The thigh type shows, as a rule, paralysis of the iliacus, iliopsoas, and glutei; in these cases the leg simply hangs loosely from the body and cannot support the weight. When the upper extremity is affected the paralysis usually follows two types—the upper-arm type and the lower-arm type. In the upper-arm type the muscles about the scapula, the deltoid, biceps, and supinator longus are paralyzed and atrophic, so that the motions at shoulder and elbow are badly executed; the shoulder-joint is unusually movable.

In the forearm type the flexors and extensors of wrist are involved; in other cases the small muscles of hand are affected or there may be a combination of both. In long-standing cases the claw-hand results. Sometimes the upper arm and forearm are both affected. Occasionally the muscles of trunk are affected.

The deep reflexes of the paralyzed muscle are always lost. Sensation is not affected. Curvatures of the spine result either from paralysis of the muscles of trunk, or, more frequently, from compensation owing to the lack of development of a paralyzed limb. The muscles which are most frequently permanently paralyzed are those of both legs, then one leg, each being equally liable; then all the extremities or combinations of one leg and one arm; then one arm, and, least of all, the muscles of the trunk.

The diagnosis is seldom difficult. In some children rickets may make them liable to attacks of fever; there may be pain in the extremities and the legs may hang lifeless; in these cases the signs of rickets can usually be made out, there is no special atrophy, and careful watching will show the ability to move the limb. Peripheral neuritis may resemble this affection in its paralysis, but the pain and tenderness are usually much more

marked; it seldom occurs in children, and the distribution is too regular.

Erb's paralysis, causing loss of power in the deltoid, supinator longus, biceps, and coracobrachialis, may occur at birth or after, from injury to the brachial plexus, and appear very much like infantile paralysis, but the lack of general symptoms at the onset, the history of injury, usually clear such cases up.

**Chronic anterior poliomyelitis (progressive muscular atrophy)** is characterized by atrophy and paralysis of groups of muscles, due to inflammation or degeneration of cells in the anterior cornua of the cord.

The disease occurs in adult life; males are more frequently affected. It is more frequent in neuropathic families.

The first symptom noticed is weakness of the small muscles of hand and difficulty in performing fine movements, and soon afterward there is an apparent atrophy of the thenar eminence, and, as the disease progresses, all the small muscles of thumb and the interossei are weak and atrophied. It becomes difficult to touch the thumb and tips of the fingers, and separation of the fingers is greatly lessened. Abduction of the little finger may be impossible. One hand is usually affected before or to a greater degree than the other, but the disease is always bilateral and generally symmetrical. The flexors and extensors of the forearm become affected some time after the muscles of hand, but before this happens the hand is usually held in the position called "main en griffe," or "claw-hand." The thumb may be rotated out. In the upper arm the deltoid is most affected, and this may appear before the paralysis of the forearm. The rotundity of the shoulder is lost and the head of the humerus can be felt.

The biceps, brachialis anticus, and supinator longus follow in order. The supraspinatus and infraspinatus are also affected, as well as the teres major and minor and subscapularis. The serratus magnus may be affected and winged scapula may result. The Rhomboid and middle and lower part of the trapezius may be involved, but the upper part never is affected. The triceps, latissimus dorsi, and lower half of the pectoralis major almost always escape. The extensors of neck may be affected and the head falls forward like a dead weight.

The intercostal muscles may be affected, but the abdominal muscles are usually all right.

The legs often escape altogether, but sometimes the tibialis anticus and peronei alone are affected.

The muscles, when wasted, may show partial reaction of degeneration. The affected muscles usually show fibrillar contraction of their fibres; the contraction is increased by irritation and fatigue. The muscles are never rigid. The reflexes are lost when corresponding muscles are affected, but the knee-jerk is usually preserved. There are no sensory symptoms. The sphincters are not affected.

The course is steadily progressive over several years, although respiratory difficulties may cause death.

The diagnosis may be difficult in the early stage to differentiate from the idiopathic muscular atrophies, which may occur about the thumb and forefinger from overuse. In these cases there is no reaction of degeneration and no fibrillar contraction and no tendency to marked progression, and there is less symmetry.

In syringomyelia the atrophy may look the same, but there are trophic disturbances and sensory symptoms; there is less symmetry in the paralysis as a rule.

In peripheral neuritis the muscles paralyzed may be the same, but, as a rule, the legs are just as much affected in neuritis as the arms; there are marked sensory symptoms. There is much greater rapidity in its development. The knee-jerks are lost. There is much pain or sensitiveness. Recovery, more or less complete, is the rule.

## BULBAR PALSY.

**Bulbar palsy** is due to inflammation or degeneration of the nuclei of origin of the seventh, eleventh, and twelfth nerves and the motor part of the fifth. Some bulbar palsies are produced by lesions just below the nuclei and some by lesions above.

**Sudden bulbar paralysis** is due to hemorrhage, thrombosis, or embolism of a branch of the vertebral or basilar arteries.

The onset is sudden; there is vomiting, giddiness, or sometimes unconsciousness, or the patient may wake up affected. In marked cases there is paralysis of both sides of the tongue, the soft palate, and pharyngeal muscles, and sometimes of the vocal cords. In other cases one side only is affected. The muscles of the facial nerve are sometimes affected. There may be numbness. Sometimes there is numbness on one side of the

body. If the nuclei of origin of the nerves is involved the muscles atrophy; this may be noticed in the tongue.

Reflex response to irritation of the fauces may not be present. If there is no wasting of the muscle and no electric changes, and if reflex action is preserved, the lesion must be above the nuclei of origin, but it may be difficult to tell how far above. In some of these cases recovery is complete, but often there is only partial improvement.

Sometimes death follows from respiratory difficulties or foreign-bodied pneumonia.

**Acute Bulbar Paralysis.**—This affection is comparable to the lesion in infantile paralysis, but the lesion is an uncommon one.

The onset is with fever, malaise, pains in the extremities, nausea, and vomiting. Paralysis occurs in some of the facial muscles, in the tongue, pharynx, and larynx. Mild cases may recover, but severe cases are usually fatal from respiratory insufficiency.

**Chronic bulbar paralysis (glossolabiolaryngeal paralysis)** occurs between the ages of thirty and sixty; it is more frequent in males.

The disease may exist alone, but it is more frequently a part of progressive muscular atrophy or amyotrophic lateral sclerosis. The symptoms come on gradually, with some difficulty in speaking or singing. On account of the tongue being affected certain consonants which are produced by the tongue approximating the teeth or soft palate, the former being dental *t*, *d*, and *th*, are first affected, and afterward the latter, the guttural *k*, *g*, and *ch*. General weakness of the prehensile power of the tongue with atrophy develops. Fibrillar contractions may be observed. The orbicularis oris is next involved; the power of whistling may be lost and the explosive labials *p* and *b* are very difficult to pronounce; the aspirate labial *m* and the resonant labial *f* may still be sounded.

The mouth may increase in size transversely and the chin muscles may be affected. The rest of the facial muscles may not be affected. Paralysis of the soft palate gradually takes place, which also affects speech, making it more nasal, and the gutturals *k* and *g* cannot be made clearly; *b*, *p*, *f*, *v*, and *m* may not be pronounced clearly, as some of the air escapes through the nose. If the mouth is held closed and the cheeks inflated some of the air passes through the nose. The vocal cords are liable to be paralyzed later, and the cords cannot be

approximated; the voice is low in pitch and coughing is impossible. Sometimes the masseters, temporals, and pterygoids are involved so that mastication is difficult. In time the patient looks terribly; there is a melancholy look and the mouth cannot be closed. The speech is monotonous and low, and only a few vowels can be pronounced clearly. There is regurgitation of food through the nose and it may be drawn into the larynx, and there is no power to cough it out. Saliva is dribbling all the time on account of difficulty in swallowing. The wasting progresses steadily and the place where the tongue should be looks like an irregular sac. There are always fibrillar contractions of muscular fibres, especially of the tongue. There is reaction of degeneration to some extent while there is any muscle left.

The faucial reflex is lost.

When there is combined amyotrophic lateral sclerosis the jaw-jerk is obtained in the early stages. The disease is very chronic, but is steadily progressive; death usually occurs from bronchitis or pneumonia, often from foreign bodies, or from strangulation.

The diagnosis may be difficult in the early stages. In the supranuclear lesion the muscles do not waste; there is no fibrillar contraction; there are reflexes and normal electric reactions. In nuclear and infranuclear lesions the muscles waste; there are fibrillar contractions and reaction of degeneration, with lost reflexes.

As a rule, typical cases of bulbar paralysis are easily recognized.

# CHAPTER XXIII.

## DISEASES OF THE BRAIN AND MENINGES.

### MENINGITIS.

**Tuberculous meningitis** is an acute affection of inflammatory nature due to the invasion of the pia mater by the tubercle bacillus, with the production of miliary tubercles along the sheaths of the vessels of the pia mater and the exudation of lymph into the subarachnoid space and lateral ventricles, with softening of the brain, the spinal cord being almost always affected in the same way.

The lesion may be primary or secondary. It is much more frequent in young children than in adults. Most of the cases occur between one and two years of age. Inherited predisposition is a frequent cause.

The onset is usually insidious, especially in children; there may be prodromic symptoms which are present for two or three months before acute symptoms arise; in such cases the children are cross, take little interest in their toys, do not sleep well, may grind their teeth or have night-sweats. Bodily nutrition fails. In older children there may be a marked reluctance to talk and speech may be slow and the manner sulky. Occasionally there is aphasia or great delay in answering questions. The bodily functions may not be intelligently attended to.

In adults early symptoms may resemble hysteria; the behavior may be strange; the urine and feces may be passed involuntarily. Children are often somnolent, but adults are more wakeful; headache is not complained of by children as much as by adults. In cases secondary to tuberculosis elsewhere the first thing to announce inflammation of the meninges may be a squint or double vision or palsy.

Sometimes sudden vomiting may usher it in. In some cases which are secondary to severe tuberculosis, meningeal symptoms may never have been noticed. The invasion of the disease may

occur with a convulsion which is general; there may be a tonic and clonic stage or simple rigidity and loss of consciousness. When the disease is fully established it advances more or less characteristically. In many cases the symptoms are very acute and severe and do not let up, but produce death in a few days. The majority of cases have periods of improvement and go on for three or four weeks before the fatal issue. In rare cases recovery takes place. A detailed review of the symptoms is necessary to form a true picture of the disease.

In the early stages the face looks distressed and frowning, but after a time the expression is vacant and the pupils are dilated. There is usually a flushed appearance at first, with a scarlet suffusion of the whole body; the "tache cérébrale" may be elicited on scratching the skin.

The skin is dry and harsh. The child lies on one side and does not like to be disturbed; the feet and legs are drawn up. Later in the disease the dorsal decubitus is assumed and the legs are extended.

Photophobia is more frequent in adults. In children the hydrocephalic cry, which is a sudden, high-pitched scream without apparent increase in the suffering, is very frequent. The child is usually quiet, but it may be very restless and roll from side to side. Delirium is not frequent, but a semicomatose condition is very common.

Pain is usually severe in the head, especially in adults, although in children much complaint may be made of the head. Pain may also be referred to the joints and extremities or back. Vomiting usually occurs early and may be incessant, but, as a rule, not more than twice in twenty-four hours. The vomitus usually comes up without much retching and sometimes shoots out with force. In the late stages vomiting usually ceases. Constipation is the rule, but diarrhœa occurs in some of the cases.

The pulse is apt to be somewhat slow at first, with a faltering, irregular beat, which is rather characteristic. In the later stages it is frequent and feeble. The slowing in the early stages is less marked in very young children. Respiration is apt to be irregular at first; sometimes a sighing respiration is seen during the prodromic period. Cheyne-Stokes breathing is often present late in the disease or the breathing is then rapid and shallow.

The mouth and arms are sometimes used in a quasi-purposive

manner, such as pursing the lips, grinning, snarling, or picking at the nipples, lips, or genitals.

As a rule, the muscles of the neck are a little stiff, especially in adults, but although marked retraction is sometimes seen, it is very rare.

Tremor of the head and neck and limbs is usually present on motion after the disease is well established.

Convulsions are very frequent. The invasion may manifest itself in this way: they are usually solitary, but during the early part of the worst stage convulsive movements of certain parts may come and go. The face, trunk or any of the extremities may be involved in a clonic spasm; it may affect first one part and then another. General convulsions are very common in the third stage of the disease.

Rigidity of the limbs usually takes place in time, but this is more common after general convulsions.

Ocular paralyses are not infrequent, even early in the disease; the face may also be affected; these are apt to be temporary, but occasionally we see permanent hemiplegia or facial and oculomotor paralysis. Difficulty in swallowing may occur late in the disease. Hyperæsthesia is frequent early in the disease, but sensation is diminished toward the end. The eyes sometimes move in jerky spasms. The pupils are usually contracted at first, but later they are widely dilated and vacant. On approaching a light they usually contract and then dilate, and this may be repeated for a few times after the light has been removed. In the last stages reaction to light is lost. Irregularity of the pupils is frequent. In the last stages the lids may not close and corneal ulceration sometimes occurs. Optic neuritis is often present during the height of the disease.

Miliary tubercles are sometimes seen on the choroid.

The temperature runs a very irregular type; sometimes it is continuously lower than normal, but there are usually irregular rises; it sometimes runs up very high and suddenly falls. In the late stages it is usually high.

The patient at first is usually irritable and restless and rather heedless, later he passes into a semiconscious condition from which he may be roused. In the last stages coma is complete, although sometimes there is a sudden return of consciousness.

The spinal meninges are usually affected, but do not often give definite symptoms of their own. Lumbar puncture may

obtain pus. This may infect animals. Sometimes tubercle bacilli are found.

The diagnosis may be difficult in the early stages because gastroenteritis with ptomaine poisoning in children, the exanthemata and pneumonia often give marked cerebral symptoms, such as convulsions, stiffness of neck, contracted pupils, and semicoma. As a rule, the temperature is higher in these cases and there are either pulmonary or gastrointestinal symptoms, and in the exanthemata the rash usually makes the diagnosis.

In early typhoid with cerebral symptoms it may be more difficult; the regularly increasing temperature, less irritability, and less notice taken of the physician are of value in forming an opinion of typhoid. Headache may be a marked symptom in both; but in typhoid headache disappears with the delirium, while in meningitis it increases.

In some cases, typhoid with no positive diagnostic points, going on for a few weeks, may very well be taken for tuberculous meningitis. In these cases Widal reaction or the examination of the blood may determine the nature of the case.

Otitis media with mastoiditis or abscess of the brain may be puzzling, unless definite ear symptoms and signs can be made out. Double otitis media may occur in a child from exposure or the exanthemata; in such cases the head symptoms may be marked with great irritability; there may be vomiting or screaming, or convulsions may occur; such cases may go on for a few weeks and the symptoms will cease after a little discharge of pus from the ear.

From ordinary meningitis the symptoms are slower in their onset, as a rule, and there is less retraction of the head and often more retraction of the abdomen. Rashes are seldom present.

When the meningitis is chiefly on the convexity in ordinary meningitis the symptoms are more severe, convulsions are more frequent, but the distinction may be impossible.

Thrombosis of the cerebral sinuses may have similar symptoms, but hemorrhages in the fundus of the eye is important as well as history of some source of infection.

Abscess of the brain in adults may be very similar in its symptoms; the presence of chronic otitis media or any other suppurative focus may point to abscess.

Intracranial tumors, especially if tuberculous, often point to

tuberculous meningitis. In tumor the symptoms are more constant and slowly progressive, and the symptoms do not vary so much from day to day. Hemiplegia or palsies are more common in tumor; also Jacksonian epilepsy. Optic neuritis is usually more severe in tumor.

**Simple meningitis in children** usually occurs in one of two forms. The inflammation is found either in the posterior fossa, in the pia mater under the medulla and pons and adjacent cerebellum, or in the pia mater over the convexity of the brain and over the frontal convolution. The specific cause is a diplococcus.

1. The posterior basic class is much the more frequent. Most of the cases occur before the end of the first year, the average age being about five months. The disease may be seen as late as the sixth year. The average duration of the disease is about eight weeks, but it may be as short as three or as long as fifteen.

The onset is, as a rule, sudden, with vomiting, fever, and retraction of the head. The pupils are often contracted at first; the eyelids may show clonic spasm; nystagmus is frequent; squint occurs occasionally. Optic neuritis is not frequent, but there may be amaurosis. Stupor may occur early, but it may disappear. In some cases coma supervenes.

The majority of cases die; some recover completely, others are rather backward after recovery and a number of cases develop hydrocephalus.

2. The Vertical Class.—Here the inflammation occurs over the convexity of the brain. The duration is usually about one week. These cases are comparatively rare. Pneumonia, pericarditis, and empyema may coexist with these cases and the symptoms may be quite latent. These cases always end fatally. Retraction of the head is absent or very slight; ocular symptoms are seldom present and vomiting is infrequent. Convulsions are frequent and are often associated with high fever. Convulsions are almost always general. The patients may complain of headache, but they are usually too young for specific symptoms. They refuse nourishment and soon pass into a semicomatose and comatose state.

It has been found that these children, as a rule, had poor health previously, and had either suffered from some of the infectious diseases or had had chronic otitis media.

The differential diagnosis between these two forms, tuberculous meningitis and epidemic cerebrospinal meningitis, at certain stages is almost impossible.

In the posterior basic form the onset is usually with vomiting, head retraction, or convulsions. The fontanelle in many cases shows bulging early in the disease.

Persistent retraction of the head is a very excellent sign of the posterior basic form, but it is seldom seen in vertical cases. Nystagmus is more common than in tuberculous meningitis, while strabismus is less frequent. Pupils are not very often affected; they may be contracted early in the disease and be dilated toward the end. Optic neuritis is not frequent, but amaurosis is not uncommon and seems due to inhibition of the lower visual centres in the corpora quadrigemina or corpora geniculata or the optic thalami.

Otitis media is not often present at the time of the inflammation. More or less irregular movements of mouth and jaw are seen during the progress of the disease.

The muscles of the back may be involved when there is much contraction of the neck muscles. Spasm of the limbs may be present also; transitory flexor spasm is frequent, but persistent extensor spasm is more characteristic; there may be flexion of the lower limbs and extension of the upper, or *vice versa*. Convulsions may occur, but they are not frequent, and are never as frequent as in the vertex cases; they may occur at any period.

Paralysis of the facial muscles is occasionally seen, but paralysis of the extremities is not frequent.

Screaming is very frequent at the onset and may continue more or less throughout the disease. Moving the child is apt to bring it forth.

Breathing is often sighing, irregular, or Cheyne-Stokes. The pulse is usually very frequent.

The temperature is usually high, and terminal hyperpyrexia is frequent. Vomiting is almost an invariable symptom and it is usually excessive.

The reflexes are usually increased. Rapid wasting is the rule.

Hydrocephalus is a very frequent result of the posterior basic form and its presence is shown by the increasing enlargement of the head, by the separation of the sutures and reappearance

of the lateral and posterior fontanelles; the cranial bones may be thinned.

At the onset pneumonia, the exanthemata, and typhoid fever may show marked cerebral symptoms, but in none of these is retraction so marked or vomiting so persistent as is found in the basic form, but the vertex cases often cannot be determined. From tuberculous meningitis it is known by the retraction of head, absence of optic neuritis, more nystagmus, longer duration, more frequent pulse, and rigidity and contraction of the limbs.

Lumbar puncture may withdraw pus and a culture of diplococci may be obtained.

Simple meningitis in adults is rare. The epidemic form has been described.

## CEREBRAL EMBOLISM.

**Cerebral embolism** is almost always due to valvular diseases of the heart, especially mitral stenosis, but the source of an embolus may be a fragment of a clot of blood which has formed in the left auricle during the puerperium, or in an aneurysm or in the wall of a diseased vessel.

When such an embolus occludes a branch of a cerebral vessel, local anæmia and œdema result in the area supplied by the vessel; sometimes venous engorgement follows with slight hemorrhage from the small vessels, which produces the condition known as red softening. In many cases circulation is restored rapidly or in time, but often the area softens, breaks down, and a cyst or a patch of yellow softening results. If the plug is septic, abscess may follow. Sometimes when the wall of the artery below the embolus is diseased an aneurysm may form. The left side of the brain is affected in about 60 per cent. and the right in 40 per cent. The middle cerebral artery or one of its branches is the most likely point for the embolus to stop, but other arteries in this order may be occluded—posterior cerebral, anterior cerebral, basilar, and cerebellar.

## CEREBRAL THROMBOSIS.

The cause is either diseased vessels, atheroma and endarteritis due to old age, gout, syphilis, or morbid states of the blood.

Syphilis is the most frequent cause. The arterial wall becomes

rough, the circulation is slower, and a local deposit of fibrin and red and white cells result, which may or may not organize.

The state of the blood which favors coagulation is seen in old age, chlorosis, pregnancy, typhoid fever, or any condition which may lead to a very low state of health.

Such occlusion results in slow or sudden stoppage of the circulation and impaired nutrition of the brain, which may lead to red and yellow softening. This is far more serious than in most cases of embolism. As syphilitic conditions are amenable to treatment, they may be considered less serious.

The *symptoms* of occlusion of the cerebral vessels in many cases are the same in thrombosis as in embolism, although special causes may give rise to other symptoms.

The onset is always sudden in embolism and generally so in thrombosis, but if there has been an increasing occlusion of a vessel there may be prodromic symptoms, such as headache and vertigo and temporary weakness of muscles of face or one arm or leg.

Sudden death may result from occlusion of a large vessel, especially of the basilar. There is immediate coma; the breathing becomes stertorous or Cheyne-Stokes, and death takes place in a few hours or days.

Sudden coma is not frequent, and although cases with coma are often fatal, yet a return to consciousness may occur in a few minutes or after hours. Hemiplegia is the most frequent result of embolus or thrombosis; it usually appears suddenly; not uncommonly the patient awakes to find himself paralyzed on one side. Sometimes there is sudden weakness which improves quickly, but within a day the hemiplegia is well marked. The leg and face are seldom as much affected as the arm; it is a frequent thing to see the leg and facial paralysis disappear while the arm is left helpless. As a rule, there is no sensory disturbance unless the region supplied by the posterior cerebral artery is occluded, when there may be some anæsthesia of the same side. If the lesion is in the posterior part of the internal capsule there may be homonymous hemianopsia on the same side (the field of vision on the opposite side being lost). If the blood supply of the occipital lobe or the cuneus be cut off, besides hemianopsia there may be peripheral limitations of the field of vision.

Aphasia is frequent with occlusion of the left side, and in right-handed persons if on the right side. In some cases of embolism aphasia is the only symptom, but it is generally combined with hemiplegia. Where there is paralysis of the right side without aphasia the leg is affected more than the arm.

The limbs paralyzed are usually rigid; at first this can be corrected, but unless power returns contractures occur in course of months, but such may never be severe.

The deep reflexes of the paralyzed side are always markedly increased, while the superficial reflexes are diminished. The bladder and rectal functions are normal. The above conditions are found when the lesion is in the cortex or the internal capsule. When the crus cerebri on one side is affected there may be involvement of the third nerve, with dilatation of the pupil and ptosis of the upper lid on the side opposite the hemiplegia. If the upper part of the pons is affected the hemiplegia is regular, but if below the origin of the seventh nerve there is paralysis of face on side of lesion and paralysis of arms and leg of the opposite side. With such a lesion the external rectus on same side is apt to be paralyzed. Occasionally the tongue on side of lesion, with paralysis of opposite arm and leg, may be affected if the lesion affects the root of the hypoglossal nerve. In early life after hemiplegia the hands and arms may be affected with mobile spasm, which produces more or less constant movements called *athetosis*. Wasting of the muscles is usually due to inactivity, but occasionally trophic changes are present. The nerves around the joints may be affected with neuritis, which gives characteristic symptoms.

Sometimes there is an acute, sloughing bed-sore which comes on a few days after the hemiplegia sets in, even in spite of great care; the exact reason for this trophic disturbance is not well understood.

Following thrombosis, particularly, convulsions may occur at intervals; there may be several in one day; these are a post-hemiplegic phenomena, and if there is any suspicion of kidney lesion they may be mistaken for eclampsic seizures, but the true cause is likely the irritation of the lesion to cells in the vicinity, which are in an unstable condition.

Mental derangement is not a rare sequel; there may be acute mania, but, as a rule, there are emotional disturbances, slight

irrationality, and forgetfulness, with visual delusions or delusions of many varieties.

These cases may show improvement at times, but, as a rule, mental derangement may be considered a bad omen, for dementia may set in at any time.

**Thrombosis of the cerebral veins and sinuses** is either due to some septic infection or is the result of the condition of the blood.

1. THE SIMPLE FORM, which is non-infective, is found in severely exhausting diseases; it may occur in infants from marasmus or in old age from weakness, and in middle life after prolonged diseases.

The longitudinal sinus is most frequently affected, but the cerebral veins may also be involved.

The symptoms may not be positive during life. After prolonged diseases, there may be headache and general convulsions. There may be some œdema of the scalp. The patients become dull and usually pass into a comatose condition. In severe forms of chlorosis this condition may arise, especially after hard work. The signs are ushered in with headache, vertigo, and vomiting. In bad cases convulsions come on, they may be general or on one side only and may be followed by paralysis. Recovery may take place and hemiplegia is left. Optic neuritis is a frequent sign and recovery from it may not be complete. Death is the usual end of these cases.

2. THE INFECTIVE THROMBOSIS is more frequent in adults than in children. In most cases otitis media or mastoiditis is the cause, but the infection may come from nose or throat or from erysipelas. Compound fractures of the skull may occasion it. Sometimes meningitis results or abscesses. The jugular may be involved in the infection and be felt as a round, hard cord.

The condition can usually be diagnosed by the occurrence of fever, severe headache, vomiting, diarrhœa, and a very great tendency to severe rigors and profuse sweating. Œdema of the scalp near the sinus, as over the mastoid, is frequent. Pain over the sinus is often present. Sometimes pulmonary infarctions with cough and prune-juice expectoration may be present, when feeble breathing with crepitant or subcrepitant rales, may be heard. The breath and expectoration may be very offensive owing to pulmonary abscesses. The mental condition is usually unimpaired. Often there is diarrhœa and abdominal distention.

Severe headache and fever, with delirium usually occur. In some cases the symptoms of meningitis or abscess of the brain ensue.

## CEREBRAL HEMORRHAGE.

When traumatism is not the cause there must be either chronic endarteritis which has resulted in fibrosis, atheroma, or aneurysms of the cerebral vessels; or excessive intra-arterial pressure, which may be temporary from sudden or prolonged strain; or is the result of a chronic condition like Bright's disease of the kidneys.

Spontaneous hemorrhage occurring in young and healthy subjects must be due to a defective condition of the bloodvessels, the cause of which is not understood. Inherited tendency is very striking, but this is only to be expected because of the great hereditary tendency to such diseases as gout which affects the bloodvessels. There are certain diseases which profoundly affect the blood, as pernicious anæmia, which predispose to hemorrhage anywhere; the brain is not exempt in such cases, but is not particularly liable. The greatest period of liability is between the ages of forty and fifty, although when the percentage of all deaths after fifty are considered it would be seen that the percentage from cerebral hemorrhage is greater after fifty than before.

Women are much less affected than men, probably because of lesser liability to strain.

While many cases occur during sleep, the majority occur during or just after violent physical or mental exertion. The most common seat of the hemorrhage is in the region of the lenticular nucleus, due to a rupture of a branch of the middle cerebral which runs between the lenticular nucleus and the external capsule. The vessels of the pons come next, and then the corona radiata of the frontal region. Branches of the carotid are twice as liable as branches of the vertebral.

When the hemorrhage is not immediately fatal, but destruction of brain tissue has been complete, there will follow secondary degeneration of the descending white fibres of the medulla and cord.

Prodromic symptoms may be due to atheroma and irregular blood supply to the brain or to minute hemorrhage; they are sometimes felt for a few days before the hemorrhage. Giddiness,

mental irritability or depression, headache, and transitory aphasia have been described as preceding the attack, but most cases occur without previous warning. A dazed feeling in head, followed by sudden unconsciousness, is frequently the first symptom; this occurs in the majority of cases. Sudden pain is sometimes felt in the head. Convulsions are not common; occasionally the onset is with Jacksonian epilepsy, which denotes irritation of the cortex, but it may follow hemorrhage into the pons. If consciousness is recovered it is usually within a few hours, but if not in this time, the outlook is grave, although unconsciousness may last several days before death takes place.

During coma the face, as a rule, is turgid and cyanotic, and the body sweats profusely; occasionally the color is natural and the face is composed. The breathing as a rule is stertorous, with much rattling of mucus in the throat. The cheeks may puff in and out during breathing. The breathing may be deep and slow or Cheyne-Stokes, which is a bad sign.

The pulse is usually slow; irregularity is often present and is a bad sign.

Vomiting may occur early, especially in cerebellar cases. The head is apt to turn toward the side of the lesion, the eyes, too, may show conjugate deviation toward the same side. Sometimes during a convulsion it turns the other way. In a few days the head and eyes straighten. The pupils may be contracted or dilated or unequal.

The temperature usually falls at first, but in a few hours it usually rises and, in severe cases, may reach 107°.

In large hemorrhages all reflexes are abolished and there is loss of bladder and rectal control. The urine may contain albumin or sugar. As the patient recovers consciousness it may be seen that one or more extremities do not move, and if raised fall heavily; sometimes there is rigidity of the paralyzed side. In many cases of cerebral hemorrhage there may be paralysis of one arm, leg, or face without unconsciousness taking place. Aphasia is sometimes the only symptom.

Sudden death is rare; occasionally death takes place in five to ten minutes, but, as a rule, fatal cases occur within twelve hours, although coma may last a week before death. Sometimes after recovering consciousness there is a relapse with a fatal ending; this is probably due to a second hemorrhage or rupture into the lateral ventricles.

Patients who recover usually show improvement within six hours.

**Localizing Signs and Symptoms.**

**Corona Radiata.**—Even large hemorrhages may take place without definite localizing signs, but, as a rule, there is hemiplegia or aphasia or hemianopsia from involvement of some of the fibres from these centres.

**Cortex.**—Hemorrhage seldom occurs over the surface of the brain or very near it.

**Crus Cerebri.**—Hemorrhage here can only be told by the implication of the third nerve on the side opposite to the hemiplegia.

**Pons Varolii.**—Hemorrhage at this point may present very distinctive features. Loss of consciousness is profound; there may be convulsions, either general or affecting the lower limbs. The pupils are often strongly contracted. Paralysis on the side of the face on the side of the lesion and hemiplegia of the opposite side may result, unless it is high up, when facial paralysis is on the same side. If the sixth nerve only is affected there is paralysis of the external rectus on the same side. If the nucleus is involved there will be defect of conjugate deviation of the eyes on the same side; the eyes will look away from the lesion. Vomiting is frequent in pons hemorrhages.

Hemorrhages in the medulla are not common and are usually fatal.

**Cerebellum.**—The diagnosis is very difficult; there may be sudden pain in the head and vomiting. Large hemorrhages are usually fatal.

**Meningeal Hemorrhage.**—Non-traumatic cases are rare; if it does occur, there is usually severe headache, general convulsions, and coma.

Diagnosis.—From embolism may be difficult; unconsciousness is not as frequent in embolism, and, if present, the return of sense is usually much faster. Cardiac disease or some septic source is usually found in embolus. Embolism may occur in young people. There is less febrile reaction in embolism. From thrombosis it is more difficult. When severe hemiplegia occurs without loss of unconsciousness, hemorrhage is less likely.

In epilepsy there are convulsions, often followed by coma or

deep sleep, but the subjects, as a rule, are young; there is previous history; there is no rise of temperature, no paralysis.

Acute Alcoholism.—Alcoholic breath is not a good guide, because a suffering patient may have been given a drink; the pupils are no guide. Loss of power and reflexes must be looked for, but in some cases it may be impossible to tell. An alcoholic subject can sometimes be told by appearance. When coma is profound, breathing is more stertorous or irregular in apoplexy.

Opium Poisoning.—The pupils are very finely contracted in this affection; the breathing is very slow; the temperature does not rise. Convulsions are against opium poisoning.

Uræmia.—Here there should be great increase in the tension; the pulse is labored. There is no fever. Albumin and casts are usually present.

## ABSCESS OF THE BRAIN.

Abscess of the brain is always due to a secondary infection; aside from septic wounds of scalp and cranial bones the most frequent causes are disease of the bones of the ear and nose and purulent inflammations at some distant part, especially in the lung or pleural cavity.

The inflammation runs an acute, subacute, and chronic course.

The abscess is usually situated in one of the cerebral hemispheres, more particularly the temporosphenoidal lobe, but in a number of cases it has been found in the lateral lobe of the cerebellum. Abscess is more frequent on the right side.

One abscess is the rule, but sometimes several collections of pus are found. For the physician suppuration of the middle ear and mastoiditis play the most important part in the causation of this affection. In these cases the abscess is almost always on the side of the affected ear. Abscess of the brain may give rise to meningitis.

The symptoms and signs are extremely variable, dependent upon the cause and the severity of the virus.

1. **Cases which are secondary to pyæmia or ulcerative endocarditis** may give no special brain symptoms; in these cases the abscesses are small and sometimes numerous, but on account of the severity of the general disease any cerebral symptoms may be looked upon as a part of the disease; but if severe headache, optic neuritis, or interference with brain functions

present themselves, the condition should be recognized before death.

2. **Acute abscess of brain** with rapid softening and invasion of a great deal of brain tissue is not frequent; such cases may be secondary to a septic source. In these cases there is usually fever, severe headache, stupor, or delirium; sometimes there are convulsions. Occasionally there are localized symptoms and signs of meningeal irritation. These cases are usually confounded with meningitis.

3. **Chronic cerebral abscess** is by far the most important variety. These cases may or may not communicate with the surface through some channel. The cases which may have an external opening are not frequent, but occasionally there is a channel through the bone, especially in connection with ear diseases, through which they partially discharge.

Some abscesses of brain are latent until they break into lateral ventricles or subarachnoid space and set up acute inflammation. As a rule, they present fairly definite symptoms. Headache is usually marked and sometimes intense; it may be general or confined to one area. Vomiting may be persistent. Anorexia is usually present. Fever is almost always *absent;* sometimes the temperature is subnormal. The pulse is almost always abnormally slow at first, but later may become frequent and irregular. Emaciation is usually progressive. Optic neuritis is present in most of the cases; it is usually double, but sometimes is only on the side of the lesion. Jacksonian epilepsy or general convulsions are sometimes seen. Sensory or motor aphasia, monoplegia, or hemiplegia may occur, and occasionally hemianopsia.

The diagnosis may not be difficult in some cases, but localizing the pus is often impossible.

A source of infection should always be found; the ear particularly must be examined as well as the nose, heart, and lungs.

From meningitis the differentiation is often impossible; a subnormal or normal temperature, hemiplegia, aphasia, or monoplegia are in favor of abscess, while Jacksonian epilepsy is more in favor of meningitis.

The symptoms of meningitis are usually more acute, and retraction of neck or stiffness of the muscles are more often present.

The absence of a cause for abscess is greatly in favor of meningitis.

Sinus phlebitis may resemble abscess, but there are usually rigors and fever; œdema of scalp and tenderness over the exit of jugular in the neck are in favor of phlebitis; sometimes both occur together.

The differentiation of abscess and middle-ear disease or mastoiditis may be very difficult in children, who easily show marked cerebral symptoms with convulsions in the latter affection.

The absence of fever, slow pulse, optic neuritis if present, paralysis or coma, of course, are in favor of abscess, but, unfortunately, these distinctive symptoms are not always present.

In the case of tumors the points to be chiefly held in consideration are the absence of a cause of infection, more severe headache, more frequent optic neuritis, less irregularity of the temperature, a slower progress (as a rule), less emaciation, more frequent involvement of parts which abscess seldom invades, and the greater frequency of tumors.

From thrombosis with softening; it is usually found that the latter cases have no source of infection, the subjects are older, syphilitic history is frequent, and the course is more acute.

## INTRACRANIAL TUMORS.

All new-growths within the cranium are included under this term. In order of frequency are found tuberculous growths, syphiloma, glioma, and sarcoma; then much less frequently come carcinoma, fibroma, osteoma, and very rarely simple or parasitic cysts, psammoma, neuroma, and lipoma; these are of very little clinical importance. Some tumors originate on the surface of the brain or on the inner plate of the skull; others arise from the substance of the brain. No region is exempt. Some of the growths are very rapid in their course; others are quite slow, taking months or years. Others may cease to grow and remain stationary. Tumors are seldom seen at either extreme of life. Tuberculous tumors are more frequent in children. Melano-sarcomata are more common in middle life, but may occur in childhood.

Syphilitic tumors are most frequent between the ages of thirty and forty-five, but occasionally occur in young subjects from

congenital syphilis. Sarcoma is more common at middle age, but may occur at any time of life.

Glioma occurs between twenty and fifty. Tumors are more frequent in men than in women.

The symptoms of intracranial tumors are very varied, not only because of their diverse situations, but also on account of the lack of uniform character and rate of growth.

In most all of the cases the course is very chronic. There are certain symptoms which are more or less common to all intracranial growths, and others which depend on their position.

The most frequent general symptoms are headache, vertigo and vomiting, double optic neuritis and optic atrophy, general convulsions, and signs of mental failure.

The most important localizing symptoms are paralyses of various forms, derangements of associated movements of the ocular muscles, Jacksonian epilepsy, rhythmical tremors, localized inco-ordinations, reeling gait, anæsthesia, hemianæsthesia, hyperæsthesia, hemianopsia, hemiopic flashes of light; disturbance of smell, hearing, and taste; aphasia and glycosuria.

Headache is the most frequent of the general symptoms. In some cases the pain is intense, but it may not be severe; it is rarely absent. It is usually paroxysmal, with intervals of freedom from pain. It is apt to be worse in the morning. The pain may be referred to the interior of skull or be general, or referred to some particular point which may be tender, especially in case of gumma or malignant growth involving the bone; such a tender area may be of localizing value. There may be neuralgic pains in the fifth nerve.

Double optic neuritis is a very frequent sign and possesses more positive value than headache. Occasionally it is unilateral. It occurs in about 80 per cent. of the cases.

Vomiting is very frequent; it is apt to occur on rising; it is often paroxysmal. Although it is a general symptom, it may indicate that the site of the tumor is subtentorial.

Vertigo is a variable symptom; it is sometimes very persistent and suggests involvement of the middle lobe of the cerebellum. Sometimes it is due to ocular paralysis.

General convulsions from cerebral irritation are not infrequent; they may cause death. They occur singly or are repeated several times in one day.

Mental changes of slight and rather emotional character are

frequent in the early stages, while delusions and actual insanity occur in severe cases.

Tumors of the frontal lobe are more frequently accompanied by mental deterioration.

Apoplectic attacks are occasionally seen in vascular glioma owing to extravasations of blood from rupture of vessels.

Paralysis often has special value in localization, although hemiplegia may be due to involvement of the cortex, conducting tracts passing through the centrum ovale, internal capsule, crura, pons varolii or medulla; paralysis is often temporary when following Jacksonian epilepsy. Bilateral paralysis is apt to be due to a tumor of the pons or medulla and sometimes of the cerebellum, when large and exerting pressure downward; in such cases there may be an intentional tremor resembling that of cerebrospinal sclerosis.

The reflexes on the paralyzed side are always increased except in some cases of cerebellar tumors, when they may be diminished or abolished.

Jacksonian epilepsy is almost always due to cortical irritation of the motor area; such tumors are usually syphilitic or tuberculous; the spasm begins in a few muscles and spreads to one limb or one side and often to the whole body. The site of the cortical irritation corresponds, as a rule, to the centre for the muscles first in spasm.

Athetoid movements are occasionally seen in tumors near the optic thalamus. In cerebellar tumors rigidity of the muscles of spine is sometimes seen.

Inco-ordination is not present, but a reeling gait may sometimes be seen in cerebellar tumors.

Sensory disturbances are not frequent and are of little value in localization. When the cerebral functions are depressed, loss of tactile sensation to some extent may be present. Hemianæsthesia is occasionally seen in tumors near the posterior part of the internal capsule or gyrus fornicatus. Occasionally local anæsthesia is seen when the tumor involves the motor area of the brain.

Neuralgia is sometimes seen in tumors affecting the root of the fifth nerve. Visual disturbances are frequent; diminution of vision or blindness is frequently seen from the optic neuritis and optic atrophy.

Hemianopsia is sometimes seen and it is important as a

localizing sign. The most common variety is homonymous lateral, which may result from a tumor involving the optic tract, the fibres which pass from the optic tract to the half vision centre, or the centre itself in the occipital lobe. Bilateral temporal hemianopsia is occasionally observed from the pressure of a tumor in the centre of the chiasm. Flashes of light sometimes occur from tumors in the occipital lobe.

Hearing disturbances are not frequent. If the auditory nerve at the base of the brain is compressed there is deafness on the same side; likewise if the centre in the pons is affected.

If the auditory centre in the first temporosphenoidal lobe is affected, deafness of the opposite side may result; sometimes there is word deafness from the same cause. Disturbances of sense of smell and taste are rarely affected.

Aphasia is seldom due to a tumor; temporary aphasia is sometimes seen after a fit of deafness.

The function of the bladder is seldom interfered with. Polyuria and glycosuria are sometimes seen, but are of no value in localization.

In most cases emaciation occurs after a time, but much depends on the suffering. The temperature is usually normal or subnormal. The pulse is normal or slower, but in the end usually becomes accelerated and irregular. Cheyne-Stokes breathing is frequent toward the end. Bed-sores may occur if nursing is not good.

The course is variable. Some cases never give symptoms; others simply show general symptoms; others have well-marked localizing symptoms.

In some tumors there are indications of a tumor, but no positive symptom.

The differential diagnosis is sometimes very difficult.

Lead poisoning with severe headache and palsy—the blue line and nature of paralysis will make this clear.

In young women hypermetropia and anæmia may cause most persistent headaches which are difficult to relieve, and with other symptoms may simulate tumor. Amenorrhœa may produce optic neuritis and severe headaches, and the diagnosis may be impossible to make.

Hysteria may present symptoms of tumors of the brain, but the examination of the eyes and reflexes may clear the case up.

The diagnosis of the nature of the tumor is often made on

probabilities. Syphilitic history and other signs are often of great value; the history of night pains and of tenderness of the skull is of almost positive value. The age must always be considered. Tuberculous tendencies and early age may be of much value in the diagnosis of tuberculous tumors.

The duration is important; fibromata are very chronic; gliomata may be very rapid. Cancerous and syphilitic affections are also rapid. Sarcomata are variable. Antisyphilitic treatment is of great value in many cases for diagnosis.

## INTRACRANIAL SYPHILIS.

Several varieties of pathological conditions are found in the cranium due to syphilis. They are always tertiary, and include gummata, obliterating endarteritis, periarteritis, pachymeningitis, and gummatous meningoencephalitis. These conditions seldom present any pathognomonic symptoms; it is rather by a train of phenomena that the diagnosis is made.

A random succession or association of symptoms—for instance, aphasia and left-handed hemiplegia or ptosis and hemiplegia on same side—would seldom be seen in any other than a multiple syphilitic condition.

Syphilitic processes are usually acute or subacute and rarely chronic. There is a marked tendency to remission and exacerbation of the symptoms.

Curability is often possible, but the effects of treatment may be variable and uncertain.

The symptoms in almost every case begin with headache, which is most intense during the night and may be practically absent during the day; as a rule, it is general, but sometimes it is more severe at some particular point; occasionally this point is tender. In prolonged cases, when other symptoms appear, headache may diminish in intensity or disappear.

Insomnia is frequent, especially because of pain, but pain does not seem the only cause. Vertigo and gradual failure of mental power, somnolency with stupidity as a pronounced feature, is present in long-continued cases. Epileptic fits are not infrequent, but Jacksonian epilepsy is more common. Verbal aphasia, incoherency, and melancholia or mania may occur.

Cerebral thrombosis and irregular blood supply, on account of chronic endarteritis, is of frequent occurrence from syphilis. It

usually results in hemiplegia, aphasia, or hemianopsia, but if the pons or crura cerebelli are affected there may be crossed paralysis or double hemiplegia.

Cerebral hemorrhage from syphilis is not frequent.

Gummata of the cortex, meninges, or arteries are frequent. The cranial bones are often involved. In such cases headache is very pronounced, but may become less after the cranial plates have been perforated. Jacksonian epilepsy is not infrequent, and there may be hemiplegia, monoplegia, or aphasia. Optic neuritis is quite frequent. The paralyses usually begin gradually and are not of sudden onset.

Syphilitic inflammation at the base of the brain with gummata is distinguished mainly by the involvement of the cranial nerves. The eyes especially are apt to be affected, either with optic neuritis, hemianopsia, temporal or lateral homonymous, or ophthalmoplegia externa.

Diffuse meningeal and arterial syphilis is characterized by failure of mental powers and dementia.

## EPILEPSY.

**Epilepsy** is characterized by a sudden discharge of nerve force owing to undue irritation or diminished central control of the highest nerve centres. The exact cause is unknown, although predisposing causes are well understood.

There are two well-known types. *Grand mal*, which is characterized by general convulsions and lost consciousness, and *petit mal*, which has various manifestations, both sensory and motor, but in which loss of consciousness plays only a small part. Over one-half the cases occur in the second decade of life and one-quarter in the first, but no age is exempt.

The phenomena of grand mal are very regular. The patient usually becomes affected without warning, although not infrequently there is a peculiar sensation in the head, epigastrium, or about the heart, which precedes the attack momentarily, being called the aura, but with or without this, consciousness is lost and the body falls, sometimes with a sudden cry. A tonic contraction of the muscles of whole body, which lasts about thirty seconds, takes place; during this spasm some of the muscles get the better of others, so the face and eyes may turn to one side; the arms are usually flexed a little and the fingers are in the

position of interosseous flexion, although they may be contracted. The legs and feet are usually extended, although sometimes they are drawn up. Respiration ceases during the tonic spasm; the face becomes cyanotic. When relaxation begins breathing commences in a jerky way and there is frothing at the mouth, and the point of the tongue may be bitten. The tonic spasm is followed by remitting contraction of the muscles and then by intermissions, the ending being a jerk. When air first enters the larynx there may be a stridulous noise. The tongue is bitten because, being in tonic convulsion, if one side is stronger than the other, it is thrown between the teeth when the jaw first relaxes.

After the convulsion a period of quiet or sleep usually ensues.

The phenomena of petit mal may consist only of a peculiar sensation of head or some part of the body; oftentimes there is a period of vacancy, when the expression is fixed or vacant, followed by rambling talk or some peculiar action; the patient does not fall, but is usually aware of the minor attacks, although sometimes there is no recollection of what has taken place.

When petit mal begins with sensory aura, of which only the patient is aware, it is called "sensations." When consciousness is lost they are called "faints" or "turns."

The varieties of the minor attacks are so numerous that complete description is impossible. In most cases there is cessation of conversation, a vacant look, and the dropping of anything which may be in the hand. Pallor of the face usually succeeds the attack. There is no disturbance of the pulse. Conversation may be continued where it was left off at the beginning of the spell. Loss of consciousness may be incomplete; the patient may see things about him, but relativity is lost. There may be momentary loss of vision or hearing. In other cases there are flashes of light.

It is not infrequent for the same patient to have both forms of epilepsy.

The auræ are very numerous; they are either motor, sensory, or psychical. The patient may run a certain distance or turn around several times. Giddiness seems to be a motor phenomenon due to the excess of motor discharge on one side, so that the patient appears or feels as if he were turning toward the opposite side. In some cases of epilepsy due to local brain irritation, as may occur in infantile hemorrhage, or from throm-

bosis or from depression of bone from injury, the general convulsion may be preceded by slight spasm in face or extremities; occasionally such aura are sensory, as tingling or numbness in one arm or foot.

Sensory auræ without local irritation in the brain may be a peculiar feeling which ascends from the legs through the trunk. Epigastric auræ are the most common; these are undescribable feelings which arise in the epigastrium and ascend to the throat, suggesting fulness or smothering. Cephalic auræ may be a fulness or constriction or vertigo.

Olfactory and gustatory auræ are infrequent; there may be peculiar or disagreeable odors and tastes.

Auditory auræ are still less common, but there may be whistling, ringing, or crashing sounds; voices or distinct words are sometimes heard. Sudden deafness may occur.

Visual disorders are more frequent than others of the special senses; the warnings may be flashes of light, stars or sparks, or colored lights. Sometimes visual pictures are seen. Sudden blindness is not infrequent, and this may be followed by a discharge of sparks or flashes of light.

Mental derangements often occur in these cases.

Psychical sensations may be of fear, and of sensation of wrongdoing; peculiar visionary ideas may occur.

Postepileptic symptoms are not infrequent. Vomiting is frequent. A tendency to sleep is usually marked. There is often an inclination to roll on the abdomen and to sleep with face buried; this may lead to death from suffocation.

Automatic continuation of what the sufferer had been doing before the attack is frequent, but the patient when fully recovered may not have been aware of such action. A tendency to fumble with the hands or mutter unintelligibly is frequent. Oftentimes there is a great desire to undress. A frenzied state is sometimes seen, of momentary duration.

Postepileptic hysteroid convulsions are sometimes seen in the minor attacks of young people; at times hysterical convulsions immediately follow a minor attack and confuse the diagnosis. In some cases genuine epileptic attacks and hysteria may occur at different intervals.

**The Course of Epilepsy.**—Minor attacks occur only during the waking hours. Severe attacks are more common during the day, but in some cases attacks occur only at one period;

in other cases there may be both day and night convulsions.

In cases which occur at an early age there is some tendency to natural cure between three and five, but, as a rule, cases are very chronic and tend to get worse. The mind is apt to become deranged in long-continued cases; for a long period mental ability may be only lessened, but insanity is a frequent result.

The diagnosis is seldom difficult except at the beginning. In those cases where fits occur at night only, the condition may pass unrecognized, but headache, sense of weariness on waking, with great disarrangement of the bed-clothes, and involuntary urination only at these times, may lead one to suspect the cause.

In distinguishing between epilepsy and hysterical fits very little difficulty should be experienced. In hysteria the movements are all such as might occur if willed; there is seldom the tendency to turn the head or eyes, bite the tongue, or froth at the mouth. In epilepsy keep the surroundings clear and no injury will result. In hysteria the convulsion is often long and much injury might be done by the tendency to move about, but never is.

Convulsions from organic brain lesion usually begin in one limb before becoming general; they are often unilateral, but in long-continued cases true epilepsy may result. In organic brain lesions other symptoms also point to the true lesion.

Eclamptic seizures may resemble epilepsy, but there is apt to be more coma between the attacks. The history of no previous convulsions, the condition of heart, bloodvessels, and urine, will usually make the nature of the attacks clear.

## CHOREA.

**Chorea** is a spasmodic affection of the nervous system characterized by involuntary, jerky, irregular movements, and sometimes by psychical disturbances, as mental weakness.

It is frequently associated with rheumatism and endocarditis. The disease is rare in negroes and Indians. It is more common in girls than in boys. It occurs most frequently in children and adolescents; 43 per cent. of the cases occur between ten and fifteen years.

That there is a great degree of association between rheumatism and chorea most observers admit, and statistics show the disease to have occurred before, during, or after chorea in from 40 to 60 per cent.

Endocarditis has been noticed in many cases which have been fatal. Statistics show that about 60 per cent. have heart murmurs.

The signs of chorea are usually easily recognized by the involuntary movements, which occur chiefly in the extremities. At first the patient seems unduly fidgety, and this is followed by jerky movements of the arm or hand; the legs are seldom affected first. Sudden facial grimaces or raising of the brows or shutting the eyes are frequent. While these movements can possibly be imitated, yet it is a point of great diagnostic value to be impressed by the very apparent involuntary manner of the motions. The patient may exert slight inhibitory action in mild cases. All degrees of severity of muscular action may be seen. In some cases squint is noticed momentarily. Action may be so severe that the teeth are injured by the snapping of the jaws. The head and limbs may be bruised by striking some object near by. In some cases the patients are thrown out of bed. It may be almost impossible to feed some cases. In some instances the disease is limited to one side. Inco-ordination of movement is occasionally seen.

Muscular weakness, sometimes called paralytic chorea, is not uncommon; in these cases the twitchings are not severe, but one arm or leg or, perhaps, both legs or arms or all four get weak; in occasional cases there is wrist-drop and lost reflexes. There is some reaction of degeneration in these cases.

Headache is not infrequent, but local pain is quite rare unless rheumatism is present. Bed-sores may form from the incessant rubbing.

In some cases mental dulness is present; they are apt to be moody and whimsical. Hallucinations of sight are not uncommon. Sometimes melancholia and dementia follow chorea.

The pupils are frequently dilated. Occasionally there is slight optic neuritis. The pulse is apt to be frequent; in some cases it is irregular and the heart's action appears choreic. The heart is usually slightly enlarged; a systolic murmur at the apex, and often heard in the axilla and back, is of frequent occurrence; murmurs over the pulmonary area are not frequent.

In some cases a presystolic murmur or the murmur of aortic insufficiency is present, but these are not frequent.

The systolic murmur at the apex is often only functional, but it is undoubtedly frequently due to endocarditis.

Erythema nodosa, arthritic purpura, purpuric urticaria, and subcutaneous fibrous nodules are not infrequent.

Fever is not often present.

Recurrence is frequent; one recurrence occurs in about 25 per cent. of the cases; there may be as many as six recurrences.

The diagnosis is not difficult except in the "paralytic chorea," when, unless involuntary movements are present, the affection would be difficult to recognize. The onset is usually quite slow; there is no pain and very little atrophy. A systolic murmur may be heard at the apex of the heart.

In most of these cases twitchings occur in time.

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